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Volume 30
Number 1

Mariners Weather Log

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Mariners Weather Log

Editor: Elwyn E. Wilson

January-February-March 1986
Volume 30, Number 1
Washington, D.C.

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Front Cover: Section of horizontal array summary of surface salinity in the Gulf of Mexico. This is one of the customized data products available from the National Oceanographic Data Center (NODC), which celebrates its 25th anniversary this year. See article on page 1.

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The Secretary of Commerce has determined that the publication of this periodical is necessary in the transaction of the public business required by law of this Department. Use of funds for printing this periodical has been approved by the Director of the Office of Management and Budget through April 1, 1986.

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Mariners Weather Log

NODC: 25 YEARS OF OCEAN DATA SERVICES

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Richard J. Abram
National Oceanographic Data Center
NOAA/NESDIS
Washington, DC 20235

The U.S. National Oceanographic Data Center (NODC) celebrates its 25th anniversary year in 1986. The center was dedicated and began its mission of building and maintaining a national marine data base on January 16, 1961. In the quarter-century since it was created, the NODC has amassed the world's largest publicly-available files of in situ ocean data and has developed service capabilities that enable users to benefit from this unique resource.

The U.S. NODC was the first institution of its kind in the world. It was the forerunner, the prototype, of NODC's that now operate in 29 other countries. Working as part of a worldwide network, these institutions ensure that valuable oceanographic data--data collected at great expense of time and resources--are preserved and stored for easy access by users around the globe.

Naval operations during World War II dramatized the value of accurate knowledge of waves and currents. Development of sonar and anti-submarine warfare techniques have shown how knowledge of ocean temperature structure and water mass properties are vital to modern defense.

The rapid growth of ocean research and ocean data collection activities following the war set the stage for the creation of the NODC. Proposed as early as 1954, the National Oceanographic Data Center was chartered in late 1960 as an interagency facility managed by the U.S. Naval Hydrographic (now Oceanographic) Office. Its mission was straightforward: to acquire, process, store, and disseminate physical, chemical, and biological data from the world's oceans.

In 1970 the NODC was transferred to the National Oceanic and Atmospheric Administration (NOAA) when that agency was created by executive order within the Department of Commerce. Today the NODC operates as a component of NOAA's National Environmental Satellite, Data, and Information Service (NESDIS). The NODC is located in Washington, D.C. NESDIS centers for climatological data (including marine weather observations) and geophysical data (including marine geological data) are located respectively in Asheville, N.C., and Boulder, Colo.

Among its many tasks, the NODC has been responsible since 1974 for producing this publication, the Marine Weathers Log. On the occasion of its anniversary, the NODC expresses its appreciation to all scientists, voluntary observers, and others who collect ocean data; your work makes our work possible.

Building a National Data Base

The principal task confronting the newly-established NODC was building a data base of historical ocean data. The Center began with a collection of data transferred from the Navy that included 2 million punched cards of physical/chemical data from Nansen casts (mostly in the North Atlantic); 3 million surface current (ship drift) observations; and 100,000 analog bathythermograph (BT) traces.

In the following years, as the NODC began its data acquisition efforts, NODC's data bases began the process of steady growth that continues to this day. By the mid-1960's NODC's holdings were largely converted to digital form and transferred from punchcards to magnetic tape. By 1970 NODC's data holdings had increased several-fold and included about 400,000 oceanographic stations and nearly 600,000 digitized BT temperature profiles.

The growth of NODC data bases paralleled the development of automated data systems. To carry out its mission, NODC developed systems for data inventorying and tracking, data processing and quality control, and data product generation. NODC operations continually benefitted from advances in computer technology, and NODC's data files and data systems have been installed on a series of increasingly large and more powerful computers. In late 1981 the data files of the NODC and the other NESDIS data centers were consolidated on a single computer system, currently a Univac 1100/62, located at the National Climatic Data Center, Asheville, N.C. Magnetic tape is still the primary data storage medium, but use of mass storage technology such as optical disk is being studied.

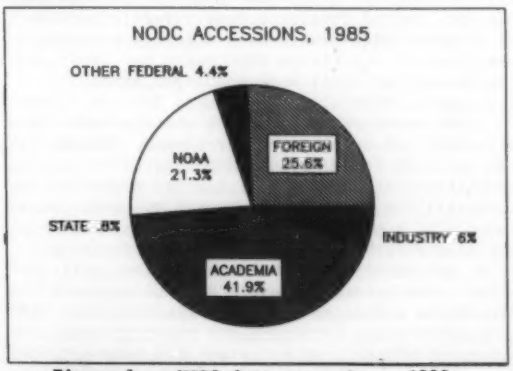


Figure 1.-- NODC data accessions, 1985.

NODC receives data from government agencies, universities and research institutions, industry, and foreign institutions (fig. 1). Data that are processable into standard formats enter the processing/quality control system and are merged into the appropriate data file. Most data are received on magnetic tape or diskette, but a small amount of data are still received in hard-copy form that must first be computerized. NODC maintains an in-house capability for digitizing expendable bathythermograph (XBT) strip charts, although here, too, technology is advancing and NODC is beginning to receive XBT data in digital form on cassettes. After data are processed and merged into the archive files, they became part of the historical data record available to NODC users (table 1).

Table 1.--Primary NODC data files

Data Type	Volume (as of Sept. 1985)
Oceanographic station data	711,983 stations
Mechanical BT data	966,734 stations
Expendable BT data	533,799 stations
Surface current data	4,175,000 stations
C/STD data (high resolution)	34,816 stations
C/STD data (low resolution)	30,805 stations
Current meter data (resultants)	5,945 obs-months*
Current meter data (Components)	7,596 obs-months*
Water physics and chemistry	20,649 stations
Pressure gauge data	209 obs-months*
Phytoplankton	2,257 stations
Primary production	6,001 stations
Intertidal organisms	1,255 stations
Fish/shellfish surveys	14,362 stations
Zooplankton	14,124 stations
Benthic fauna	4,419 stations
Pollutants	9,364 stations
Lagrangian current measurements	610 obs-months*
Coastal wave data	51 obs-months*
Meteorology and wave spectra	5,944 obs-months*

*Time series data. Amount of data reported as observation-months, i.e., measured parameters recorded for a period of one month.

Fostering International Data Exchange

The NODC's data files contain not only U.S. but also foreign data. In NODC's major global data files--for example, physical/chemical stations and bathythermograph casts--up to 80 percent of the data are of foreign origin. Participation in international marine data exchange programs has directly benefitted NODC users by increasing the total volume and geographic coverage of NODC's data holdings.

NODC receives foreign data through both bilateral and multilateral exchanges. Within two years of its creation, NODC had established data exchange relations with Australia, Canada, and the United Kingdom. Today NODC has bilateral data exchange agreements with NODC's and other institutions in 20 nations including the People's Republic China. The agreements spell out the types of data to be exchanged and the respective geographic areas of interest. The U.S. NODC maintains global data files and acquires data from all oceans and seas. Most other countries usually have limited geographic areas of interest and request data only for specified ocean areas in their regions. These data exchanges are carried out routinely, usually on an annual or semi-annual schedule.

Since 1962 the U.S. NODC has operated World Data Center A for Oceanography. This facility is one of the U.S. components of the World Data Center (WDC) System, a global network that facilitates international exchange of scientific data and information. The WDC system was originally established to support data exchange during the International Geophysical Year (IGY) of 1957-58, the program that marked the beginning of the modern era of large-scale earth observation programs. The system was so successful that it continues to function today. Among its advantages the WDC system provides a politically neutral mechanism for scientific data exchanges between Western- and Eastern-bloc nations. The NODC receives data from the U.S.S.R. and other Eastern-bloc nations via exchanges between WDC-A, Oceanography, and World Data Center B for Oceanography, which is located in Moscow, U.S.S.R.

The NODC provides data processing support for WDC-A, Oceanography. Appropriate types of data received by WDC-A, Oceanography in computer-readable form are processed by NODC and incorporated into NODC's global data files. WDC-A, Oceanography also receives and archives marine science publications. WDC-A, Oceanography's international marine data holding include over 1.9 million observations; WDC-A Oceanography also holds over 25,000 marine science publications and articles. All WDC-A holdings are described in its Catalogue of Data and Catalogue of Accessioned Publications.

The NODC participates in planning and coordination of international marine data exchange through collaboration with two major bodies: (1) the Working Committee on International Oceanographic Data Exchange (IODE) of the Intergovernmental Oceanographic Commission (IOC) and (2) the Working Group on Marine Data Management of the International Council for the Exploration of the Seas. Through work with these organizations the NODC has had a major influence on the direction and scope of data exchange among the maritime nations.

Providing Ocean Data Management

The NODC serves the ocean community not only by providing data and information to individual users, but also by providing data management services to major ocean programs. In its early years NODC provided such services on an informal basis. During the 1960's the NODC maintained working relations and received data with a number of important programs. Among these were the International Indian Ocean Expedition (IIOE) and the Equatorial Atlantic (EQUALANT) Surveys I, II, and III conducted under the auspices of the International Cooperative Investigations of the Tropical Atlantic (ICITA). The NODC provided priority processing for these data

and published various data reports describing them. The digital data format and coding form for oceanographic station (Nansen cast) data developed by NODC in 1961, which has been adopted by many organizations worldwide, received its first widespread use during IIOE.

Not until the 1970's did the term "data management" come into general currency and NODC receive formal designation as data manager for a number of major ocean programs. During these years concerns about harm to the marine environment from ocean dumping, offshore resource development, and other human activities prompted a series of environmental assessment programs conducted by Federal agencies. Among those for which NODC provided formal data management support were the:

- Marine Ecosystems Analysis (MESA) Program of NOAA,
- Alaskan Outer Continental Shelf Environmental Assessment Program (OCSEAP) conducted jointly by NOAA and the Department of Interior,
- Ocean Thermal Energy Conversion (OTEC) Program of the Department of Energy

These programs enriched NODC's data holdings with large quantities of data--particularly marine biology and marine pollution data--from the U.S. outer continental shelf.

Among the services NODC provides in its role as data manager are: (1) development of a data management plan, (2) design of data formats, (3) data tracking, (4) priority data processing and storage, (5) provision of data products and (6) production of special data catalogs or inventories.

Value and Uses of Historical Ocean Data

Each year NODC responds to hundreds of individual data requests from scientists, engineers, coastal planners, resource managers, and other users. These customers use NODC data in applications ranging from research on the ocean's heat budget to design and siting of offshore structures. Most often NODC data are used to: (1) determine ocean climatology or (2) support marine environmental assessment.

Ocean Climatology. Meteorologists have a great advantage over oceanographers. Atmospheric data can be collected from fixed stations at regularly scheduled times. At many such stations the period of record for good quality data extends back over a century. From these data the climatology of the atmosphere is well established.

With few exceptions (e.g., ocean weather stations) in situ ocean data are scattered irregularly in time and space. Data quality is also variable. Although reliable ocean temperature measurements extend back about 80 years, accurate salinities have been available only since the 1950's.

Over the years NODC developed and enhanced an integrated software system for generating data products--summaries, analyses, and graphic plots--from its data files. Many of

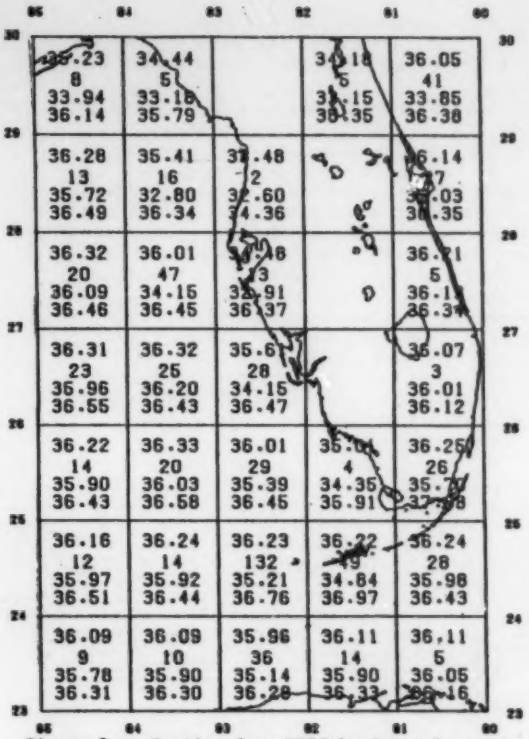


Figure 2.— Section from NODC horizontal array summary of surface salinity in the Gulf of Mexico. The data are from all years, months January-March only. From top to bottom in each one-degree square, the numbers give: (1) mean value, (2) number of observations, (3) minimum value, and (4) maximum value.

these products provide ocean climatologies for user-specified areas and time periods (fig. 2). The time and space resolution of such climatologies depends, of course, on the availability of a sufficient quantity of data in the user's area of interest. Therefore, as NODC's data holdings increase, it becomes possible to derive more accurate, more complete, and larger-scale ocean climatologies from them.

NODC data have been used, for example, to compile several special-purpose or regional ocean atlases. In the 1960's NODC compiled for the U.S. Navy a series of sound velocity atlases of the North Atlantic, North Pacific, and Mediterranean and Black Seas. The atlases presented composite sound velocity profiles by one-degree squares and season.

By the mid-1970's the growth of NODC's data files warranted an even more ambitious project, compilation of a series of atlases that summarized temperature, salinity, oxygen, and phosphate data for U.S. coastal waters. More recently NODC data, along with other available data, were used to prepare the Southern Ocean Atlas (Columbia University Press, 1982) compiled by Dr. Arnold Gordon,

Columbia University, and his co-authors. The NODC holds and provides copies of the atlas data set (6,313 oceanographic stations), and the gridded data set derived from it.

One of the most ambitious applications to date of NODC data resources was the computation of a global ocean climatology by Sydney Levitus of the NOAA Geophysical Fluid Dynamics Laboratory. In 1978 Levitus obtained all available NODC oceanographic station and bathythermograph data. After subjecting the data to careful quality review, he used an objective analysis scheme to compute global fields of major ocean variables on a one-degree latitude-longitude grid at standard oceanographic depth levels. The results of this project are presented in the Climatological Atlas of the World Ocean (NOAA Professional Paper No. 13, 1982) and a series of associated digital data tapes (available from the NODC).

The atlas and data tapes present global mean fields of ocean temperature, salinity, oxygen, and oxygen saturation. Depending on the quantity of data available for specific parameters, the analyses are for annual, seasonal, or monthly periods for depths up to 5500 m (fig. 3).

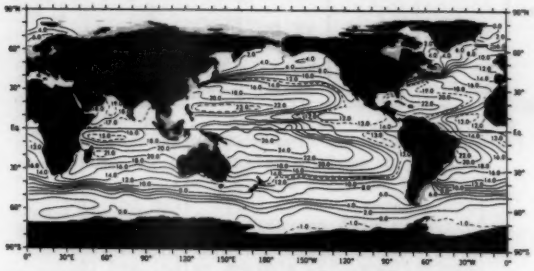


Figure 3.— Annual mean potential temperature (°C) at 150 m depth. (from the Climatological Atlas of the World Ocean).

On one hand the Climatological Atlas of the World Ocean is a synthesis of what is known about the oceans today. But it also serves as a benchmark and point of departure for a whole new range of ocean-atmosphere studies that will guide ocean data collecting activities for the next decade. Organized as components of the World Climate Research Program, (WCRP), studies such as the Tropical Ocean Global Atmosphere (TOGA) Experiment will focus on the tropical oceans.

Coverage of in situ data from the tropics and Southern Hemisphere remains sparse, however. In NODC's oceanographic station data file, for example, about 85 percent of the data are from the Northern Hemisphere and only 15 percent from the Southern Hemisphere. To support TOGA and related programs, the NODC is making a special effort to acquire subsurface temperature data from 20°S to 20°N. NODC support for and participation in TOGA will result in a further enrichment of the NODC data bank. This effort will serve not only TOGA investigators but other NODC users as well.

Environmental Assessments. A major objective of the environmental assessment programs of the 1970's (e.g., OCSEAP, MESA) was to collect sufficient data to establish baseline conditions in selected U.S. coastal areas. Such baseline data provide a standard from which to assess natural or man-induced changes in the marine environment.

A major source of the environmental assessment data held by the NODC was a group of programs conducted jointly by NOAA and the Department of Interior's Bureau of Land Management (and its successor agency, the Minerals Management Service). These programs collected data in offshore oil lease areas with special emphasis on the rapidly developing fields off Alaska. NOAA's MESA program focused on two heavily-used coastal water bodies, the New York Bight and Puget Sound. NODC archived over 2,500 data sets from the Alaskan Outer Continental Shelf Environmental Assessment Program, and over 1,000 data sets each from MESA New York Bight and MESA Puget Sound.

To support these studies the NODC developed new data files and data systems. NODC created a Marine Toxic Substances and Pollutants data file that now contains data from measurements of hydrocarbons, heavy metals, pesticides, and other pollutants at nearly 10,000 stations. To facilitate computer processing, storage, and retrieval of data about marine organisms, NODC developed the NODC Taxonomic Code, a system of numerical codes used to identify marine organisms. The first edition of the code (1977) listed 16,000 entries; today it contains about 60,000 entries and has been widely adopted by other agencies and organizations.

On the Federal level, concerns about deterioration of the nation's marine environment culminated in the enactment in 1978 of the National Ocean Pollution Planning Act. NOAA was designated the lead agency to coordinate ocean pollution-related programs of 11 participating departments and agencies. The NODC, in cooperation with NOAA's National Marine Pollution Program Ofice, was delegated responsibility for managing the Ocean Pollution Data and Information Network (OPDIN). The objective of the OPDIN is to improve user access to marine pollution data and information generated by Federal programs. One of the most significant OPDIN contributions to making available marine pollution data and information resources more useful is the development of a personal computer-based Coastal Information System (CIS). Pilot systems are already available for the New York harbor area (Hudson-Raritan Estuary system) and the Port of New Orleans. A CIS for Chesapeake Bay is in the planning stage. The CIS provides users with fingertip access to a wealth of data and information on both the natural (e.g., water conditions, fish species) and man-made (e.g., water treatment plants, port facilities) environment in their areas.

Environmental assessment data in NODC's

files support one principal goal: wise use, development, and protection of marine resources. These data served the needs of specific projects and continue to provide researchers an historical record of the health of marine ecosystems.

Conclusion

The NODC is the national repository of historical ocean data. As a service organization it welcomes inquiries from all potential customers. NODC data products and services are provided without restriction on a cost-recovery basis. Customized data products are provided for the cost of generating them. Detailed information about NODC data files and samples of available products are given in the NODC User Guide, which is provided without charge. NODC products and services are available through NODC's headquarters office as well as five liaison offices located in U.S. coastal areas (table 2).

In the next decade two activities will have a major guiding influence on ocean data management: (1) operation of a series of new ocean-sensing satellites and (2) study of complex ocean-atmospheric interactions that drive world climate. How NODC will participate in and support these efforts as it begins its next 25 years will be the subject of a future Mariners Weather Log article.

Table 2.--NODC Contact Points

NODC USER SERVICES BRANCH*

National Oceanographic Data Center
NOAA/NESDIS E/OC21
2001 Wisconsin Avenue, NW
Washington, DC 20235

202-634-7500 (commercial)
202-634-7502 (after-hours message recorder)
FTS 634-7500

CENTRAL COORDINATION AND REFERRAL OFFICE*
OCEAN POLLUTION DATA AND INFORMATION NETWORK

National Oceanographic Data Center
NOAA/NESDIS E/OCx8
2001 Wisconsin Avenue, NW
Washington, DC 20235

202-634-7510 (commercial)
FTS 634-7510

NODC LIAISON OFFICES

Northeast Liaison Office
WHOI
McLean Laboratory
Woods Hole, MA 02543
617-548-1400, Ext. 2497 (commercial)
FTS 840-7279

Southeast Liaison Office
NOAA/NESDIS/NODC
4301 Rickenbacker Causeway
Miami, FL 33149
305-361-4305 (commercial)
FTS 350-1305

Southwest Liaison Office
NOAA/NESDIS/NODC
8604 La Jolla Shores Drive
P.O. Box 271
La Jolla, CA 92037
619-453-2820 (commercial)
FTS 893-6204

Northwest Liaison Office
NOAA/NESDIS/NODC
Bin C15700/Building 1
Seattle, WA 98115
206-526-6263 (commercial)
FTS 392-6263

Alaska Liaison Office
NOAA/NESDIS/NODC
707 A Street
Anchorage, AK 99501
907-279-4523, Ext. 46 (commercial)
FTS 271-4063

*NOTE: The NODC's main offices are scheduled to be moved to a new location in Washington, DC by mid-summer of 1986. When the new address and telephone numbers are available, they will be published in the Mariners Weather Log.

Mariners Weather Log

NORTH ATLANTIC TROPICAL CYCLONES, 1985

Robert A. Case
and
Harold P. Gerrish
National Hurricane Center, NOAA
Miami, Florida

Hurricane activity in the Atlantic basin remained nearly normal for the second year in a row. The 1985 season produced 11 tropical cyclones, 7 of which reached hurricane strength. The long term average is ten, six of which attain hurricane strength. This year six hurricanes and two tropical storms struck the coastline of the United States making this the most active season for strikes on the U.S. coast since 1916. Table 3 gives a summary of this year's activity and tables 4 and 5 summarize data since 1930. Table 6 lists ships encountering winds of 50 kn or more.

Figure 4 shows the tropical cyclone tracks for 1985. A total of four hurricanes occurred in the Gulf of Mexico this season. Also tropical storm Bob formed in the southeast gulf. The east coast of the United States was struck by two hurricanes and two tropical storms, while a third tropical storm formed off the Georgia coast and a fourth tropical storm exited off the Carolina coast. This year was the fourth straight season that the Caribbean remained free from hurricane activity. Figure 5 shows the erratic tracks of hurricane Elena and Juan.

TROPICAL STORM ANA, JULY 15-19

Tropical storm Ana formed in the Atlantic about 125 miles southwest of Bermuda on 16 July. Ana moved on a northerly course and the central pressure deepened to 996 mb as it passed across the shipping lanes of the northwest Atlantic toward Sable Island. On the morning of 18 July the S.S. SEALAND PRODUCER passed very close to the center of Ana. Figure 6 shows the barograph trace of the PRODUCER with a minimum central pressure of 996 mbs, which was within a millibar of the pressure reported by the reconnaissance aircraft later that morning.

Ana buffeted Sable Island with sustained winds of 60 kn as the storm passed within 50 mi of the island. On 19 July the PACIFIC PATRIOT, located to the west of the center

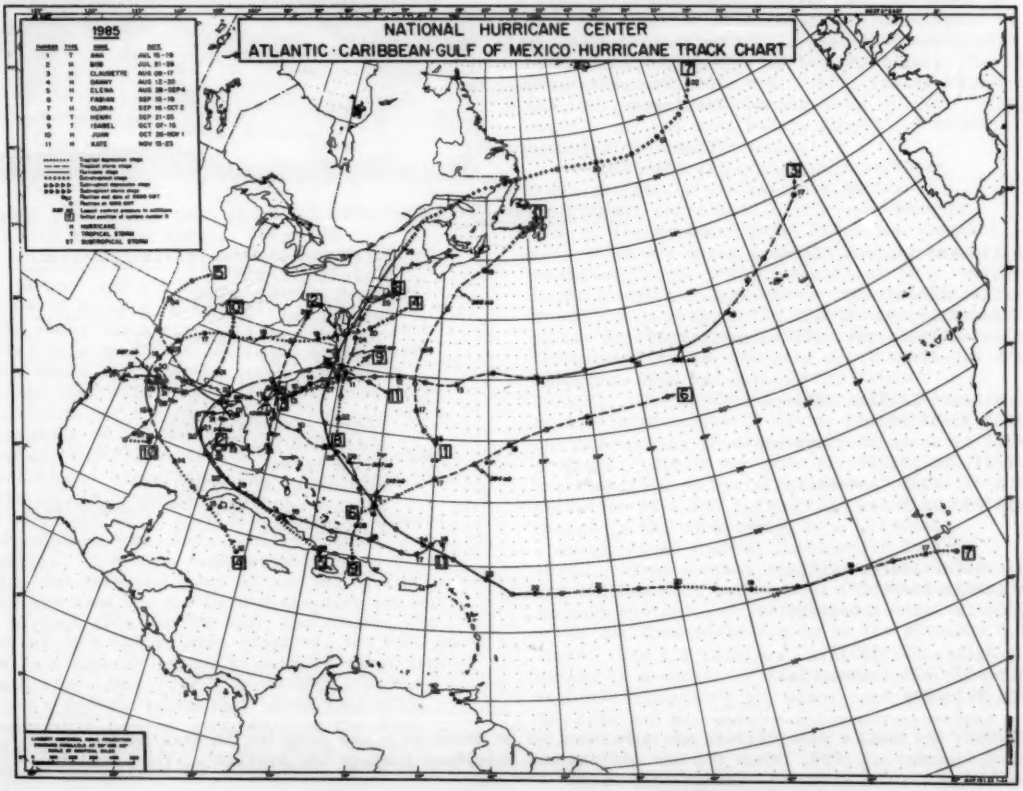


Figure 4.-- Tropical cyclone tracks, 1985.

Table 3.-- Summary of North Atlantic tropical cyclone statistics, 1985

Cyclone Number	Name	Class	Dates	Maximum Sustained Winds (kn)	Lowest Pressure (mb)	U.S. ($ Damage) (millions)	Deaths
1	ANA	T	7/15-7/19	60	996		
2	BOB	H	7/21-7/26	65	1002		
3	CLAUDETTE	H	8/09-8/17	75	980		
4	DANNY	H	8/12-8/20	80	987	50	1
5	ELENA	H	8/28-9/04	110	951	1000	4
6	FABIAN	T	9/15-9/19	55	992		
7	GLORIA	H	9/16-10/02	125	919	900	8
8	HENRI	T	9/21-9/25	50	996		
9	ISABEL	T	10/07-10/15	60	997		
10	JUAN	H	10/26-11/01	75	971	1500	12
11	KATE	H	11/15-11/23	105	953	300	5

T: Tropical storm, wind speed 34 - 63 kn
H: Hurricane, wind speed 64 kn or higher

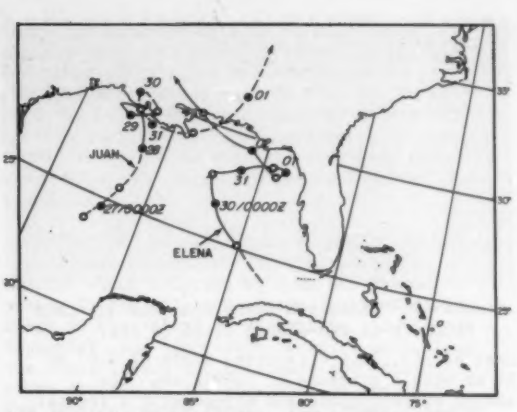


Figure 5.--Erratic tracks of Elena and Juan.

Table 4.-- Frequency of tropical cyclones by months and years.

		May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
1931			1	1	2	3	1	1		9
1932		1			3	3	3	1		11
1933		1	1	3	7	5	3	1		21
1934		1	1	1	2	2	3	1		11
1935					3	1	2			6
1936			3	2	6	4	1			16
1937				1	2	6				9
1938					3	1	3	1		8
1939			1		1	1	2			5
1940		1			3	2	2			8
1941						4	2			6
1942					3	3	3	1		10
1943				1	2	4	3			10
1944				3	2	4	2			11
1945			1	1	4	3	2			11
1946			1	1	1	1	2			6
1947				1	2	3	3			9
1948		1		1	2	3	1	1		9
1949					3	7	2	1		13
1950					4	3	6			13
1951		1			3	4	2			10
1952	(Feb)1				2	2	2			7
1953		1			3	4	4	1	1	14
1954			1	1	2	4	1	1	1	11
1955				1	4	5	2			12
1956			1	1	1	4	1			8
1957			2		1	4	1			8
1958			1		4	4	1			10
1959		1	2	2	1	3	2			11
1960			1	2	1	3				7
1961				1		6	2	2		11
1962					2	2	1			5
1963				1	1	5	2			9
1964			1	1	4	4	1	1		12
1965			1		2	2	1			6
1966			1	4	1	4		1		11
1967					1	4	3			8
1968			3		1	3	1			8
1969				1	5	6	5	1		18
1970		1		1	3	3	2			10
1971				1	4	6	1	1		13
1972		1	1		2	2		1		7
1973				2	2	2	2			8
1974			1	1	4	4	1			11
1975			1	1	2	3	1		1	9
1976		1		1	5	2	1			10
1977					1	3	2			6
1978	(Jan)1			1	4	3	3			12
1979			1	2	3	2	1			9
1980					3	5	1	2		11
1981		1	1		2	5	1	1		11
1982			1		1	2	1			5
1983					2	2				4
1984					4	6	1	1	1	13
1985				2	3	3	2	1		11
Totals	(Jan)1 (Feb)1	12	29	43	139	189	98	22	4	538

Table 5.-- Frequency of hurricanes by months and years.

	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
1931					2				2
1932				3	1	1	1		6
1933		1	1	3	3	1			9
1934		1	1	1	1	1	1		6
1935				2	1	2			5
1936		1	1	3	2				7
1937					3				3
1938				2	1				3
1939				1		2			3
1940				3	1				4
1941					3	1			4
1942				3			1		4
1943			1	1	2	1			5
1944			2	1	3	1			7
1945		1		1	1	2			5
1946			1		1	1			3
1947				2	1	2			5
1948				1	3	1	1		6
1949				2	4	1			7
1950				4	3	4			11
1951	1			2	3	2			8
1952				2	2	2			6
1953				2	3	1			6
1954		1		2	3	1		1	8
1955				3	5	1			9
1956			1	1	1	1			4
1957		1			2				3
1958				3	3	1			7
1959		1	2		3	1			7
1960			1	1	2				4
1961			1		5	1	1		8
1962				1	1	1			3
1963			1	1	4	1			7
1964				2	3	1			6
1965				2	1	1			4
1966		1	3	1	1		1		7
1967				1	3	2			6
1968		2		1	1	1			5
1969				4	4	3	1		12
1970	1			1	1	2			5
1971				2	4				6
1972		1		1	1				3
1973			1	1	1	1			4
1974				2	2				4
1975			1	2	3				6
1976				4	1	1			6
1977				1	3	1			5
1978				2	2	1			5
1979			1	2	2				5
1980				3	3	1	2		9
1981				1	5		1		7
1982		1			1				2
1983				2	1				3
1984					2	1	1	1	5
1985			1	3	1	1	1		7
Totals	2	12	20	89	119	51	12	2	307

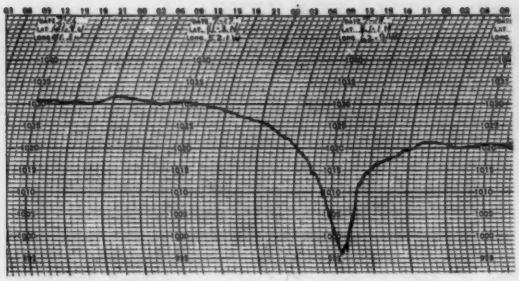


Figure 6.-- Barograph trace from the SEA-LAND PRODUCER as she passed close to Ana.

near 43.5°N, 62.4°W reported winds of 010° at 60 kn with a pressure of 1009.8 mb. Ana became extratropical and merged with a frontal trough over Newfoundland later in the day on 19 July.

Table 6.--Ships encountering tropical cyclone winds of 50 kn or more in 1985.

TROPICAL CYCLONE	VESSEL CALL SIGN	DATE MO	DAY	TIME GMT	SHIP POSITION LAT. N	LONG. W	WIND DIR. DEG	SPEED (kn)	PRESSURE (MB)
ANA	GCPZ	07	19	0000	43.5	62.4	010	60	1009.8
	FUZZ	07	19	1800	46.0	49.7	210	50	1003.0
BOB	(NONE)								
CLAUDETTE	(NONE)								
ELENA	KPGL	08	29	1800	25.6	85.1	260	55	1006.0
	ELKF	08	31	0300	28.1	85.1	200	55	989.0
	BQST	09	01	1200	25.3	86.1	280	50	1014.0
FABIAN	(NONE)								
GLORIA	H2ST	09	22	0000	21.0	54.0	130	55	1014.0
	KMMP	09	25	0600	27.0	68.2	130	50	1009.2
	KMMP	09	25	0900	27.0	68.0	140	55	1010.0
	KLNC	09	27	1200	37.7	69.4	180	50	1000.9
	SHIP	09	27	1200	38.6	74.8	330	65	985.9
HENRI	(NONE)								
ISABEL	WJSU	10	07	1800	21.0	69.5	160	50	1006.5
	KCLE	10	09	2100	30.1	80.6	030	50	1020.3
JUAN	????	10	29	0000	27.5	91.0	210	55	986.1
	SHIP	10	31	1800	26.8	85.5	260	55	998.5
KATE	KLBM	11	17	0000	20.5	66.8	350	50	1004.0
	UFBR	11	17	0600	22.7	66.5	080	50	1006.8
	UFBR	11	17	1200	22.6	67.8	010	70	1007.1
	VSBN	11	21	0000	25.6	87.8	340	60	1005.5
	SHIP	11	22	1800	32.8	77.9	170	50	1005.0

HURRICANE BOB, JULY 21-26

Bob became a tropical storm in the Gulf of Mexico southwest of Fort Myers, Florida on 22 July. The system crossed the southern Florida peninsula and turned toward the north. Bob had little effect, other than beach erosion, on the eastern Florida and Georgia coast as it moved northward. Minimal hurricane force winds were detected by reconnaissance aircraft prior to Bob's landfall on the South Carolina coast (fig. 7). Therefore, the storm was upgraded to a hurricane before its center passed over the coast near Beaufort, South Carolina at 0300, 25 July.

No ships in the vicinity of Bob reported winds of 50 kn or greater. Maximum winds at landfall occurred in rainbands along the coast. The Coast Guard station at Georgetown, South Carolina had sustained winds of 50 kn while Holden Beach, North Carolina had a peak gust of 72 kn.

HURRICANE CLAUDETTE, AUGUST 9-17

Claudette began as a non-tropical low pressure center just off the Georgia coast on

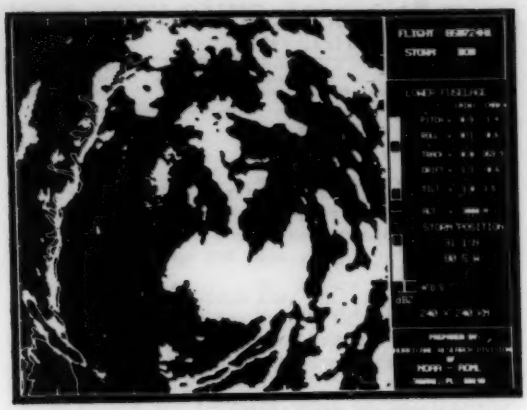


Figure 7.--Lower-fuselage radar image from NOAA P-3 aircraft of Bob ,1800, July 24. Mike Black ERL/AOML prepared this image. Courtesy of Peter Dodge, ERL/AOML.

9 August. The system moved on a northeast track and began to develop tropical characteristics as it moved over the warm waters of the Gulf Stream. It became tropical storm Claudette on 11 August while located about 120 mi southeast of Cape Hatteras, North Carolina. Claudette turned eastward and passed 150 mi north of Bermuda. Enroute to the Azores, Claudette attained hurricane strength from 14 to 16 July (980mb) and later as a tropical storm passed directly over Corvo, an island community in the Azores.

HURRICANE DANNY, AUGUST 12-20

Danny had its beginnings as an African wave which developed into a depression in the northwest Caribbean on 12 August. Danny reached storm strength in the southeast Gulf of Mexico at 0000, 14 August and became a hurricane on the afternoon of 14 August, when located about 200 mi off the Louisiana coast. The system continued to strengthen to a 987 mb hurricane as it moved onshore just southeast of Lake Charles, Louisiana at midday on 15 August (fig. 8). The hurricane quickly weakened to storm strength as it moved inland across Louisiana.

Maximum winds measured by reconnaissance

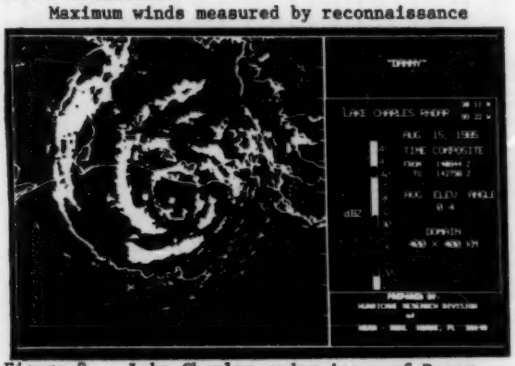


Figure 8.-- Lake Charles radar image of Danny 15 August. Courtsev Peter Dodge, ERL/AOML

aircraft near the coast at the time of landfall were near 80 kn. If there were any ships that experienced winds in excess of 50 kn, their reports failed to reach the Hurricane Center. Several oil rigs (anemometer heights and characteristics of the rigs vary from site to site) in the northwestern Gulf of Mexico had hurricane force winds. Strongest winds were reported by the rig EC42B, located at 29.5°N, 92.8°W, which had sustained winds of 80 kn and a peak gust of 100 kn.

HURRICANE ELENA, AUGUST 28 - SEPTEMBER 4

Elena was a well-organized cloud pattern as it moved across the tropical Atlantic at a forward speed of 30 kn. It finally developed into a depression just east of Cuba and was named on 28 August when the center was over central Cuba. The storm moved toward the northwest and strengthened to a hurricane on 29 August after it moved over the open waters of the southeastern Gulf of Mexico. A collapse of the steering currents caused a marked decrease in Elena's forward speed as it moved into the central Gulf on 30 August. A frontal trough, moving across the U.S. from west to east, turned Elena toward the east-northeast and spread its hurricane force winds over the northeastern Gulf. The frontal trough weakened and lost its effect on the hurricane and Elena made an anticyclonic loop off Cedar Key, Florida. High pressure began building over the eastern U.S. behind the trough and forced the hurricane to begin a gradual acceleration toward the west-northwest.

On the afternoon of 1 September, while the center of Elena was 75 mi south of Apalachicola, Florida, the hurricane reached its minimum central pressure of 951 mb (fig. 9). Thereafter, the hurricane weakened slowly to 959 mb as the center moved onshore near Biloxi, Mississippi on the morning of 2 September.

Maximum reported coastal winds were from Dauphin Island, Alabama where sustained winds of 91 kn with gusts to 117 kn were recorded.

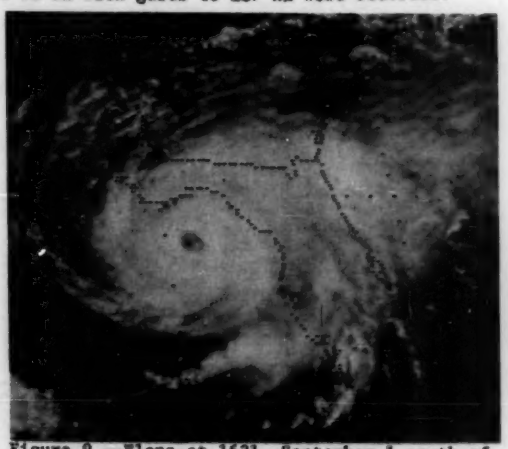


Figure 9.--Elena at 1631, September 1 south of the Florida panhandle. NOAA GOES

Most ship activity managed to stay out of Elena's path. However, three ships observed sustained winds of 50 kn or stronger. The ADRIATIC SEA located near 28.1°N, 85.1°W at 0300, 31 August reported winds of 190° at 55 kn with gusts to 70 kn and a central pressure of 989.0 mb. These were the strongest winds observed by any vessel in the Gulf during Elena.

TROPICAL STORM FABIAN, SEPTEMBER 15-19

Fabian formed from an area disturbed weather which combined with an old frontal system in the Atlantic several hundred miles north of the island of Hispaniola. On 15 September, the depression began to move along the front toward the northeast and attained storm stength by the afternoon of the 16th. The tropical storm reached its lowest pressure of 992 mb by the morning of 17 September. Fabian lost its identity in the circulation of a new, much larger, non-tropical low center by midday on 19 September. Several ships located near the new non-tropical low pressure center reported winds of 50 kn or stronger. The MARILOCK experienced winds of 70 kn or greater from 1800, 17 September through 1200, 18 September.

HURRICANE GLORIA, SEPTEMBER 16 - OCTOBER 2

Gloria has its start near the Cape Verde Islands on 16 September. Even though it was somewhat late in the season for Cape Verde storms, the system managed to maintain its westward track across the tropical Atlantic. By 22 September, hurricane Gloria approached the Leeward Islands. However, prior to reaching the islands, Gloria turned toward the northwest. On 23 and 24 September, as Gloria pursued a track parallel and just to the east of the Bahamas, the central pressure within the hurricane fell at a rate of 2 mb per hour to a minimal pressure of 919 mb (fig. 10). This was the lowest pressure observed in a hurricane since Allen (899mb) in 1980 and the lowest pressure measured in the southwest North Atlantic since aircraft reconnaissance began in the mid 1940s.

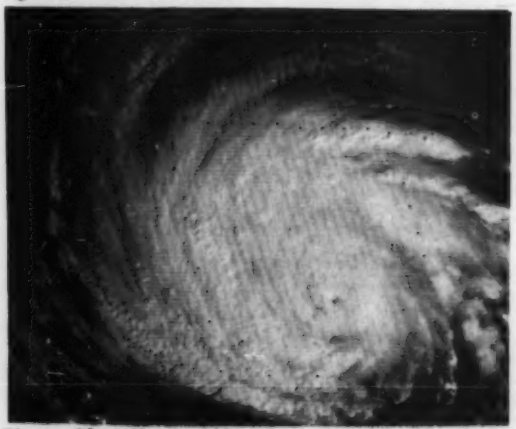


Figure 10.--Gloria 1401, September 25 east of the Bahamas. NOAA GOES

Figure 11.--Waves from Gloria break along a pier at Atlantic Beach, NC. Wide World Photo

Gloria weakened to 942 mb as it brushed Cape Hatteras after midnight on 27 September (fig. 11). Ten hours later, Gloria's center crossed over western Long Island, New York with a landfall pressure of 961 mb. The hurricane became extratropical over New England later that evening. As an extratropical storm, Gloria emerged back over the open waters of the far North Atlantic (fig. 4).

As Gloria approached the east coast of the U.S., it passed within 60 mi of a NOAA data buoy. At 2000 on 26 September the Buoy 41002, located at 32.3°N, 75.3°W, measured sea heights of 14.3 meters (47 ft). These were the highest seas ever reported by a NOAA data buoy. Eight minute sustained winds speeds measured by the buoy during this time period were near 50 kn with peak gusts to 73 kn. At 0500, 27 September, Diamond Shoal Light reported maximum winds of 85 kn with a peak gust to 104 kn. During the life of the hurricane nearly a half dozen different ships reported winds of 50 kn or stronger.

TROPICAL STORM HENRI, SEPTEMBER 21-25

Henri began in a trough of low pressure to the north of Hispaniola. The area of disturbed weather began to drift north and by midday on 21 September an organized depression developed about 400 mi east of Jacksonville, Florida. Continuing its northerly drift, it reached tropical storm strength and its lowest pressure (996 mb) while located off Cape Hatteras near daybreak on 23 September. Adverse atmospheric conditions and cooler water temperatures caused Henri to gradually weaken to 1007 mb by the time it made landfall on the eastern tip of Long Island during the late afternoon of 24 September.

TROPICAL STORM ISABEL, OCTOBER 7-15

An area of disturbed weather on the northern edge of a westerly moving tropical wave became fragmented from the wave and developed into a weak low pressure area near Hispaniola. The low pressure area was classified as a tropical depression on 7 October as it began drifting toward the north. The ROTTERDAM located near 21.0°N, 69.5°W later in the day reported 50 kn winds from 160° and the depression was upgraded to tropical storm Isabel. The storm became better organized with the minimum pressure dropping rather rapidly to a minimum of 997 mb by the evening of 8 October. However, a frontal trough approached from the northwest and strong southwesterly flow across the storm caused it to weaken and slow its northward movement. Strong high pressure behind the front then forced Isabel to take a west-northwest track toward the southeast U.S. coast.

While the storm was located well offshore on 9 October, the CHILBAR located near 30.1°N, 80.6°W at 2100, reported winds from 030° at 50 kn. Also a NOAA data buoy located at 29.3°N, 77.3°W reported sustained winds near gale force with gusts in excess of gales for a 3 hr period late on the 9th. Fortunately, Isabel had lost most of its deep convective activity by 1800 9 October and continued to weaken as it approached the coast. As a result, Isabel was downgraded to a depression near the time of landfall on the south Georgia coast. The weakened system lingered near the coast for 2 days before emerging over the Georgia/South Carolina coastal waters. Isabel moved northeastward and lost its identity as a strong frontal trough approached from the west.

HURRICANE JUAN, OCTOBER 26 - NOVEMBER 1

Juan formed in the central Gulf of Mexico in a broad trough of low pressure. Easterly winds approaching gale force and deteriorating weather developed over a broad area of the northern Gulf in response to the developing depression and a large high pressure system covering the eastern U.S. Juan became a tropical storm on 26 October and reached hurricane strength by the evening of 27 October as it made a cyclonic loop just off the central Louisiana coast for the following 24 hrs (fig. 12 and 13). The hurricane finally made landfall near Morgan City on the morning of 29 October. The following day, Juan made a second cyclonic loop around Lafayette, Louisiana before emerging over Vermilion Bay on 30 October. While inland, Juan was downgraded to a tropical storm. After skirting the Louisiana coast, Juan moved

Figure12.--Two shrimp boats stranded by receding tides of hurricane Juan. Wide World Photo.

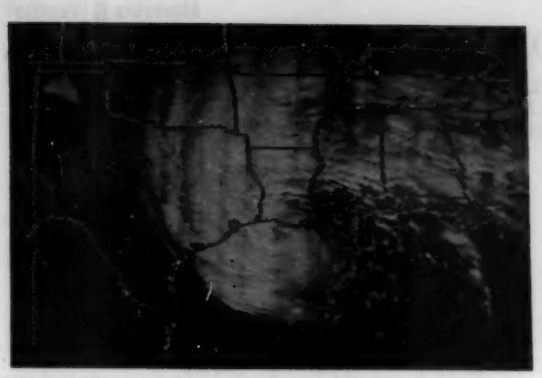


Figure 13.--Hurricane Juan at minimum pressure of 971 mb October 28. NOAA GOES

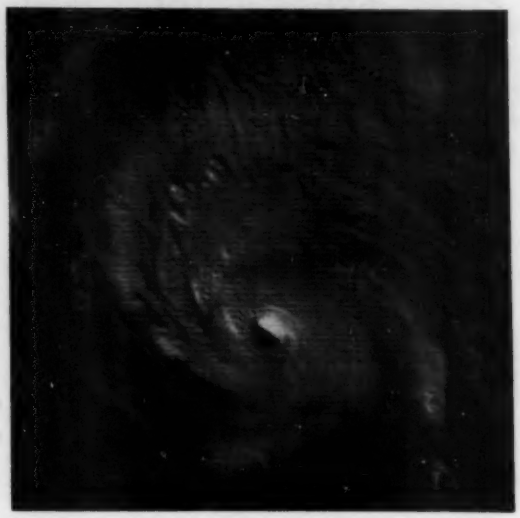


Figure 14.-- Hurricane Kate at her most intense stage, 2000, November 20. NOAA GOES

across the mouth of the Mississippi River and made landfall again just west of Pensacola, Florida at midday on the 31st.

The only surface reports of hurricane force winds were from the oil rigs in the open waters of the Gulf. Maximum sustained winds from the rigs were 80 kn with gusts to 95 kn. Only two ships reported winds in excess of 50 kn associated with Juan (see table 6).

Nine of the 12 reported deaths from Juan were caused by toppled oil rigs or boats lost while transporting oil workers. Two rigs were lost during the hurricane but fortunately, most of the crew of one toppled rig were rescued. High tides in excess of 2 meters along the Louisiana coast inundated many coastal communities and heavy rains of 10 to 15 in over parts of Louisiana caused extensive flooding. With a death total of 12 and a damage estimate of 1.5 billion, Juan was the deadliest and costliest hurricane of the season.

Figure 15.--This is what remained of two beach houses after hurricane Kate sweep through the Florida panhandle. Wide World Photo.

HURRICANE KATE, NOVEMBER 15-23

Development of Kate began just northeast of the Virgin Islands when a weak tropical wave began to interact with a upper air trough on 13-14 November. There were no ship reports from the area and by the time (15 November) reconnaissance aircraft reached the system it had already attained tropical storm strength. Kate began moving in a general westerly direction and reached hurricane force by 1800 on the 16th. The HOLSTENDAMM, located near 20.5°N, 66.8°W at 0000, 17 November, was 50 mi to the west of the center of Kate when it reported winds of 360° at 50 kn. Hurricane Kate passed more than 100 mi to the south of the BORIS BUVIN on the 17th. However, the ship experienced maximum sustained winds of 70 kn at 1200 on the morning of 17 November.

Kate strengthened to a central pressure of 967 mb by the time it moved onto the north central Cuban coast on the 19th. It maintained hurricane strength while tracking just inland along the northern coast. After Kate emerged over the waters of the southeastern Gulf of Mexico it strengthened at a rate of nearly 1 mb per hour, reaching a minimum pressure of 953 mb by 2000 on 20 November (fig. 14). Three hours earlier a NOAA data buoy in the east central Gulf (42003), located at 26.0°N, 85.9°W, reported averaged winds of 94 kn with a peak gust of 118 kn and sea heights of 10.7 meters (35 ft).

Thereafter, Kate weakened slowly to 967 mb at landfall near Mexico Beach in the Florida Panhandle late in the day on 21 November (fig. 15). Gale warnings were required along the southeast U.S. coast on the 22nd as tropical storm Kate emerged into the Atlantic waters. The storm turned toward the east and continued to weaken. Wind gusts of 23 kn were experienced at Bermuda on the morning of 24 November as the remnants of Kate passed over the island.

NDBC TROPICAL STORM OBSERVATIONS

David B. Gilhousen
National Data Buoy Center
NSTL, Mississippi

During July 1985, hurricane Bob passed near several Coastal Marine Automated Network (C-MAN) stations as it made landfall. One month later, tropical storm Danny passed within 45 mi of both a moored and a drifting buoy in the Gulf of Mexico. Time series plots comparing these data demonstrate the importance of high quality marine observations. Several important applications for marine data users are made from these comparisons.

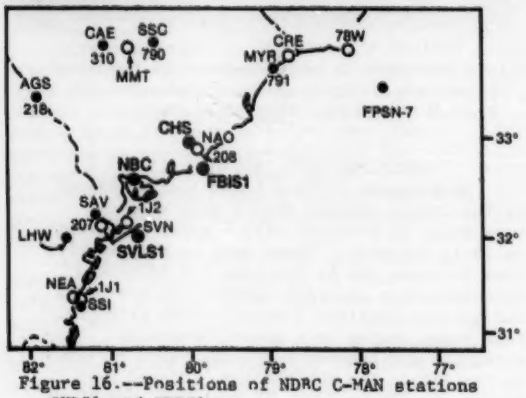


Figure 16.--Positions of NDBC C-MAN stations SVLS1 and FBIS1.

On July 25, hurricane Bob passed directly over the U.S. Coast Guard's Savannah Light Station. This Texas Tower, located about 25 nautical miles east of Savannah, GA, is also a National Data Buoy Center (NDBC) C-MAN station (see Figure 16). This station reported hourly measurements of wind speed, direction, and gust as well as air temperature, sea level pressure, and sea surface temperature. Computer graphic plots comparing data from our Savannah Light Station (SVLS1) with observations taken at Parris Island Marine Air Station, SC (NBC) are shown in figures 17 and 18. NBC is located 40 mi north SVLS1 and about 15 mi inland. Figure 17 shows that both stations had almost identical barograph traces and wind direction shifts. This means that both stations had the same exposure relative to the storm. Yet, figure 18 shows that the wind speeds at NBC were far less than those observed at SVLS1. Evidently, the frictional effects of land and vegetation reduced the wind speeds considerably at locations just a few miles inland. Mariners should keep this in mind when using observations from coastal airports.

The same conclusion can be reached by comparing data from another C-MAN site, located on the beach at Folly Island, SC (FBIS1) with observations taken at the Charleston, SC airport (CHS). CHS is 20 mi north of FBIS1 (see figure 16). Both stations were well to the east of the storm track.

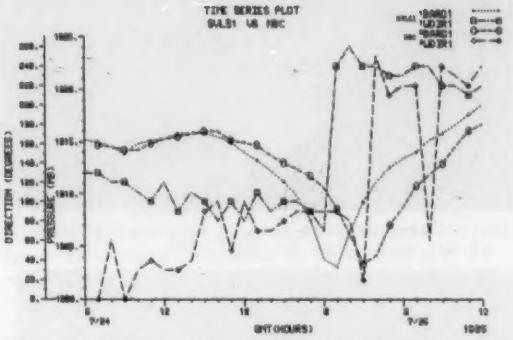


Figure 17.--Wind directions and sea-level pressure reported by Savannah Light Station, GA (SVLS1) and Parris Island, SC (NBC).

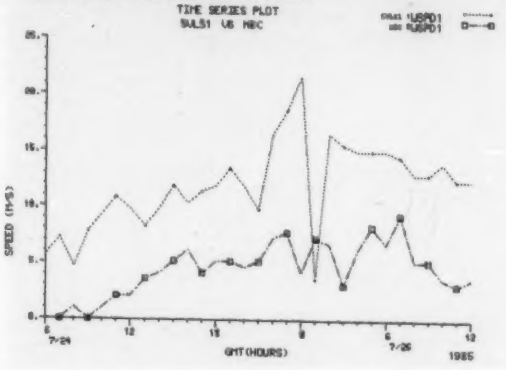


Figure 18.--A comparison of wind speeds reported by SVLS1 and NBC.

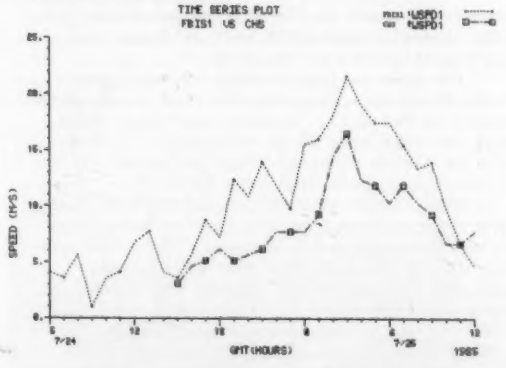


Figure 19.--A comparison of wind speeds observed during hurricane Bob at Folly Island, SC (FBIS1) and the Charleston, SC NWS Office (CHS).

Figure 19 shows that the winds at CHS were 20-35% lower than those at FBIS1.

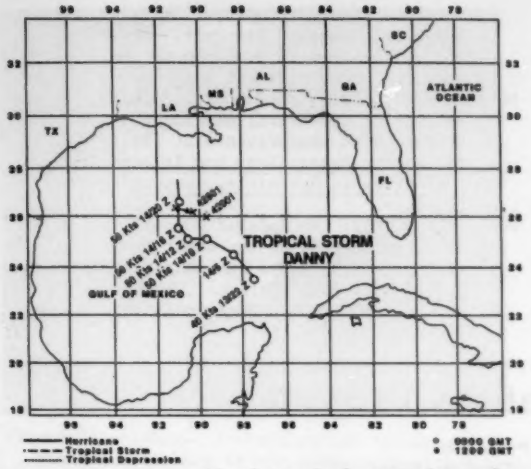


Figure 20.--The track of tropical storm Danny in relation to buoy 42001 and drifting buoy 42501.

On August 14, tropical storm Danny passed within 45 mi of both NDBC moored buoy station 42001 and drifting buoy number 42501. Figure 20 shows the track of Danny in relationship to the two buoys. Both the initial (August 13, 2200 GMT) and final (August 14, 2000 GMT) position of the drifting buoy are shown in figure 20. Figure 21 is a comparison of the wind speeds reported by the two buoys. Several interesting observations can be made.

First, the highest winds (and also the lowest pressures) were reported at 2000 GMT on the 14th when the storm was about 70 mi west of the buoy. The storm was actually closest about 10 hr earlier when it was centered about 45 mi south of the buoy. These data indicated that the storm was strengthening to near hurricane force as it passed by 42001.

Second, the drifting buoy's speeds were some 40% lower than 42001's during the approach of the storm. Though some of the difference is due to the drifter's further distance from the storm, most of the difference is due to the difference in anemometer height. Drifting buoys are span buoys whose anemometer is located only 1 meter above the water line. 42001 is a discus buoy whose anemometer height is 10 meters. Assuming a logarithmic wind profile and neutral atmospheric stability, winds at 1m should be increased by about 30% to obtain winds at 10m (Dobson, 1981). The lower speeds reported by 42501 at 2000 and 2100 GMT indicate that it was near the storm's center. Wind speeds reported by 42501 after the storm passage agree well with those observed at 42001 because of its closer proximity to the storm.

Third, note that unlike buoy observations, drifting buoy observations are not available every hour. They report through the polar orbiting TIROS satellites while NDBC moored buoys report through the GOES satellites. Consequently, there are many

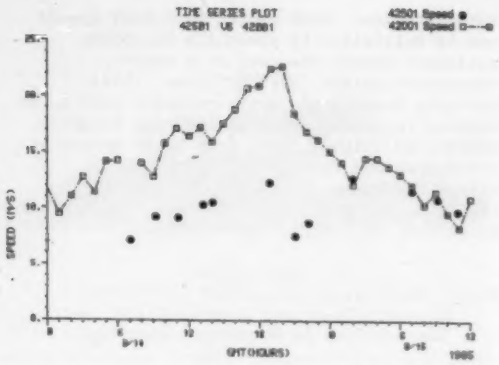


Figure 21.--A comparison of wind speeds reported b drifting buoy 42501 and moored buoy 42001.

hours when a drifter is not in view of a satellite and no observation is available. The number of observations varies roughly as a function of latitude. About four reports a day are received from a buoy located at 60° latitude. Drifting buoys can be identified by their station number. If the third digit is "5" or greater, the buoy is a drifter.

Because drifting buoys are considerably cheaper than moored buoys, expect to see a large increase in the number of drifting buoys in the next few years. Drifting buoys can also measure atmospheric pressure, air temperature, sea surface temperature, and subsurface temperature to 200 meters depth. Data from several drifters dropped in the path of hurricane Josephine agreed well with data measured by reconnaissance aircraft (Black et. al., 1985).

Also of interest is the passage of two hurricanes near NDBC buoys in September, 1985. On September 2, Hurricane Elena passed within 20 mi of moored buoy station 42007 located off the Mississippi Coast. Wind speeds of 34 m/s (66 kn) were reported. On September 26, a significant wave height of 14.3 m was measured by buoy station 41002, located 250 mi east of Charleston, SC, during Hurricane Gloria. This is the highest wave height ever observed by an NDBC buoy in a hurricane. The buoy continued to operate throughout the storm. Wind speeds and directions reported by both anemometers agreed within 0.6 m/s and 5 degrees during the storm. During the next day, sustained 49 m/s (95 kn) winds were reported by the C-MAN station at Diamond Shoals Light, NC. This report was the highest sustained wind speed ever reported by any NDBC station.

To summarize, marine data users need to know the source of the wind observations they receive. Coastal airport stations may not give wind speeds representative of those encountered in coastal waters. Different atmospheric stability over land or frictional effects may be responsible for greatly reduced speeds several miles inland. The height of the anemometer is also an important

consideration. NDBC moored buoy wind speeds can be multiplied by about 1.6 to obtain estimated speeds observed at a ship's anemometer height (15-20m) (Pore, 1982). Drifting buoy speeds would probably need to be doubled to obtain speed as the same height. Anemometer heights range from 20-50 meters at C-MAN stations located on lighthouses or offshore towers. Therefore, the speeds reported from these stations will seem high in comparison with ship observations.

References

Black, Peter G. et.al., 1985: Atmospheric Boundary Layer and Oceanic Mixed Layer Observations in Hurricane Josephine Obtained from Air-Deployed Drifting Buoys and Research Aircraft. Submitted for publication in Bulletin of the American Meteorological Society.

Dobson, F.W., 1981: Review of Reference Height for and Averaging Time of Surface Wind Measurements at Sea. WMO Marine Meteorology and Related Oceanographic Activities, Report No. 3, 64 pp.

Pore, N.A., 1982: An Updated Comparison of Surface Winds on the Great Lakes as Reported by Buoys and Ships. TDL Office Note 82-5, National Weather Service, NOAA, U.S. Department of Commerce, 12 pp.

Marine Observations Program

Jerome W. Nickerson
National Weather Service, NOAA
Silver Spring, MD 20910

SEARCH FOR NEW MARINE OBSERVATIONS PROGRAM LEADER CONTINUES

No one was chosen from the first advertisement for the Marine Observations Program Leader because of an impending reorganization of the Data Systems Division. The position will be readvertised early March 1986.

There should be no noticeable changes in service to the ships because of the MOP leader change.

MARINERS WEATHER LOG ALERT

Because of the Gramm-Rudman-Hollings Act there will be many reorganizations and changes in procedures. One of these changes is that the Marine Observations Program (MOP) will now pay for all the Mariners Weather Log (MWL) magazines we distribute.

Over the last few years there have been many changes. We need to know from you if these changes have been real improvements and how valuable you find this magazine. We may need your letters to justify the MWL in the future. The Port Meteorological Officers (PMO) will also be helping by surveying the ship's officers. Please address your letters to:

Mariners Weather Log Survey
Marine Observations Program Leader
National Weather Service, NOAA
3060 13th Street, Rm. 728
Silver Spring, MD 20910

ICEBERGS

Icebergs are fresh water ice usually of land origin; primarily breaking off of glaciers in the Northern Hemisphere. In the Southern Hemisphere they may break off the huge ice shelves that surround Antarctica. These block of ice can be as large as a small town down to ice cube size. The larger bergs may last for years in the Arctic, moving down the east side of Greenland, up and around Baffin Bay, and finally to the south until they are off Newfoundland.

Although many vessels had been sunk or damaged by ice off Newfoundland, it wasn't until the S.S. TITANIC disaster on April 14, 1912 that much was done to warn ships of the presence of icebergs. The U.S. Navy sent the scout cruisers CHESTER and BIRMINGHAM to patrol the ice regions for the remainder of the 1912 ice season.

In 1913, the Treasury Department revenue cutters SENACA and MIAMI patrolled the iceberg region southeast of Newfoundland. The British government chartered and outfitted the steam trawler SCOTIA to join the patrol.

The International Conference on the Safety of Life at Sea (SOLAS) held by 13 nations established the first regular ice patrol in 1913. Responsibility for the patrol was undertaken by the United States and assigned to the Revenue Cutter Service (predecessor of the U.S. Coast Guard) in 1914. The costs were shared by the 13 nations which was increased to 18 in 1929.

Except for the war years, 1917-18 and 1942-45 inclusive, the Revenue Service, and later the Coast Guard, have maintained this patrol annually during the ice season. Radar, aircraft and satellite sensors are now used to assist in the detecting and tracking of ice over broad areas of all oceans.

Icebergs are particularly dangerous because most of their mass (about 7/8ths) is underwater. They are irregular in shape so all icebergs should be given plenty of clearance. They are unstable and may break off, or calve smaller bergs or capsize. Because most of their mass will be below the surface, icebergs will usually move in the direction of water currents which may be greatly different than wind driven ice. Seeing a large iceberg moving across or against the flow of thinner cakes of wind driven sea ice can be quite startling (fig. 22).

Unfortunately, the visibility in the vicinity of icebergs is often marginal to poor. This is due in part to the temperature

Figure 22.--Tabular iceberg in the foreground, pinnacled iceberg in the background with a growler in between. Notice the clear wake as the bergs move with the currents through the broken sea ice field. Even the bergy bits are moving with the current through the sea ice field. U.S.C.G. Ice Patrol.

of the ice which cools the sea around it. Because the melt water from a berg is usually fresh, or nearly so, the berg will often sit in a pool of nearly fresh water that floats on the already cold ocean. This creates ideal conditions for fog and poor refractive conditions for radar.

Icebergs must be reported in accordance with SOLAS conventions as well as in the weather record forms and reports. Please refer to your NWS Observing Handbook No. 1 for the correct procedures. The weather report will be used to alert other ships and be used in forecasting the movement of the berg(s). The "Ship's Weather Observations", NOAA Form 72-1A will be used by many agencies and organizations.

NIGHTTIME OBSERVATIONS

The synoptic times for reporting weather observations are 00,06,12, and 18 GMT. This is because weather continually changes. There are two problems. First, there are still masters, mates and radio officers who think that one or two weather reports a day are enough. Second, there is usually only one radio officer on each ship. When he is off watch messages are not transmitted. The weather, however, changes during each and every hour. Weather forecasters need as much information as possible to make good forecasts.

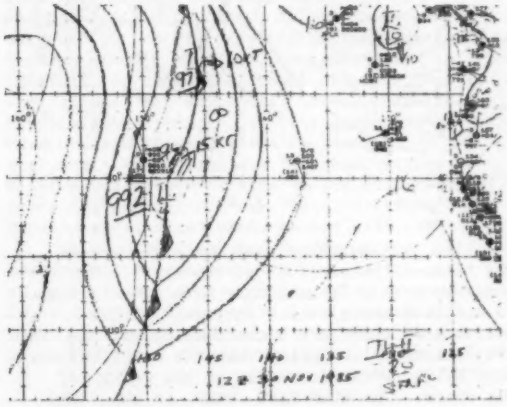
The PRESIDENT WASHINGTON, WHRN, shown in figure 23 is equipped with SEAS unit which allows the mates to transmit weather reports from the bridge by the GOES satellite. The value of these continuous weather reports both to the National Weather Service forecasters and the ships at sea is shown very well in this series of weather maps. (fig. 24).

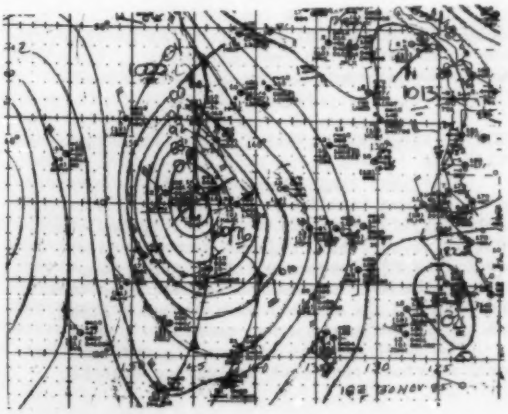
Please notice that the NOKU PAHU, radio call WBWK, made both day and night observations and is listed as one radio

Figure 23.— A photo of the PRESIDENT WASHINGTON by Deck Cadet Chris Faurot.

officer. Both ships did an excellent job of pinpointing a rapidly intensifying storm.

The first three weather maps are mercator projections from the forecaster at San Francisco (Redwood City), CA. Notice that the computer plots the weather reports on the map, but the isobars are hand drawn in a bit of a frenzy to meet the deadline and get the forecasts back out to you. This is all done in about 2 hrs.





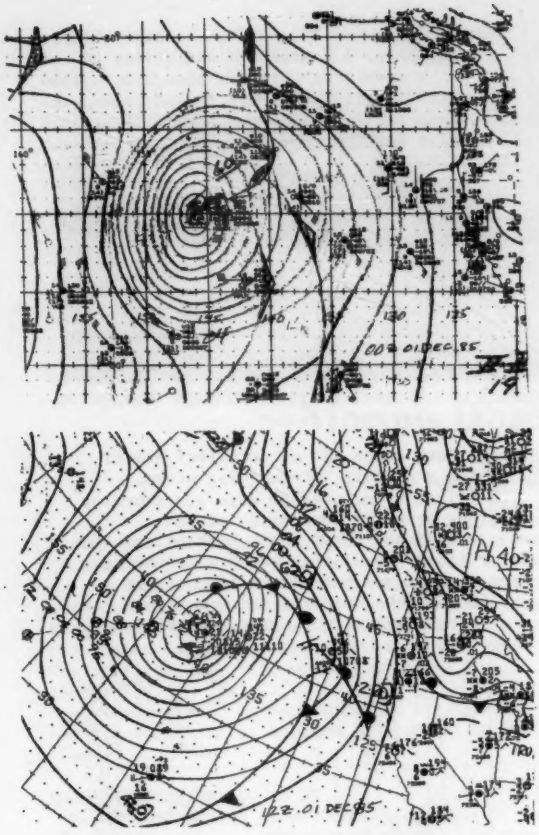


Figure 24.-- Four charts showing the storm as it developed, 12 & 18Z 30 Nov. 85 and 00 & 12Z 01 Dec. 85.

The last map is a hand analysis done at the National Meteorological Center. It is somewhat neater because they have about 4 hrs. to complete the plot and anlysis. Please notice that this is a Lambert-Conformal map projection. Also notice that the PRESIDENT WASHINGTON, WHRN, is nearly at the center of the storm. The MOKU PAHU, WBWK, is about 600 mi to the south.

The barogram from the PRESIDENT WASHINGTON shows that system coming in from the northwest on the last (December 1, 12z) map, also deepened rapidly and passed over them 12 hr. later (fig. 25).

EXTREME STORM WAVES STRIKE USCG ICEBREAKER POLAR SEA

With less than 300 nautical miles left to go on circumnavigation of North American continent, the USCG POLAR SEA was rolled about 50° by two series of extreme storm waves at about 2 AM PST October 26, 1985. The deep roll of the ship tossed four crewmembers back and forth on the 85-foot wide bridge killing one and injuring the other three.

The POLAR SEA had circumnavigated the North American continent by leaving Seattle,

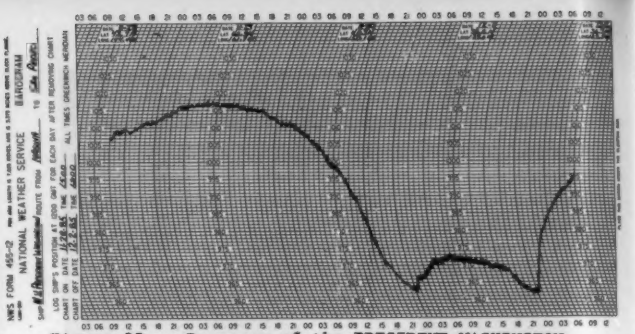


Figure 25.-- Barogram of the PRESIDENT WASHINGTON.

on June 1, 1985, passing through the Panama Canal, up the East Coast, across the top of the continent through the Northwest Passage alone (another first), down the Bering Sea and across the Gulf of Alaska to Seattle. The waves struck when the ship was about 300 mi northwest of Seattle.

Dr. Frank Gonzalez is collaborating with me on putting together an article for a future issue of the MWL on this incident.

NEW BAROGRAPH CHART (BAROGRAM)

The new barograms appear to be working very well as you can see from the earlier barogram from the PRESIDENT WASHINGTON, fig. 25. The graph was moved down 10 hpa so the observers wouldn't have to reset the barograph in storms nearly as often. Our studies showed that few observations ever went about 1040 hpa. However, the DOCTOR LYKES got up to 1040 hpa on a voyage from Rotterdam to Galveston on January 11, 1986 (fig. 26).

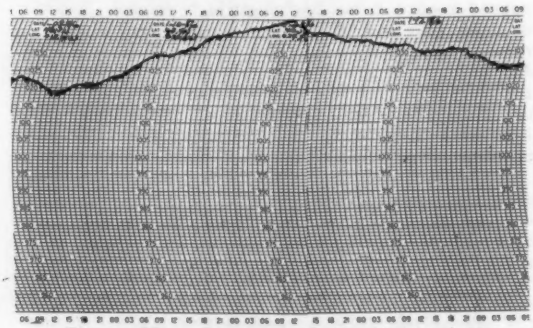


Figure 26.-- Barogram of the DOCTOR LYKES.

On the high pressure areas of both barograms where the pressure is flat one would expect low winds and low sea heights. The spikes that appear here are from pressure changes caused by opening and closing the bridge doors. On the low pressure trace of the PRESIDENT WASHINGTON barogram is the normal wave induced pumping trace.

Both the barograph and barometer are made with air tight cases and connections for rubber hoses to connect to an outside air source. This source is usually a pipe through the bulkhead to an elbow or tee to keep the water and direct wind out. See your PMO for assistance.

SEA-LAND PRODUCER AND ANNA

Philip Vecchione, 2nd mate, of the SEA-LAND PRODUCER out of Bremerhaven for New York in July 1985 sent his PMO at Newark an excellent experience story about Tropical Depression ANNA.

They had been following the directions of their weather-routing service to avoid the ice fields off Newfoundland. After the maneuver to avoid the ice field, a great-circle course was set to a position south of Block Island on July 17.

At the same time a tropical depression southwest of Bermuda had just been elevated to tropical storm ANNA. ANNA was tracking northerly at 8 kn with 50 kn winds near the center. That would place the SEA-LAND PRODUCER about 150 mi north of the center at the same longitude at about 1200 GMT on July 18 (fig. 27).

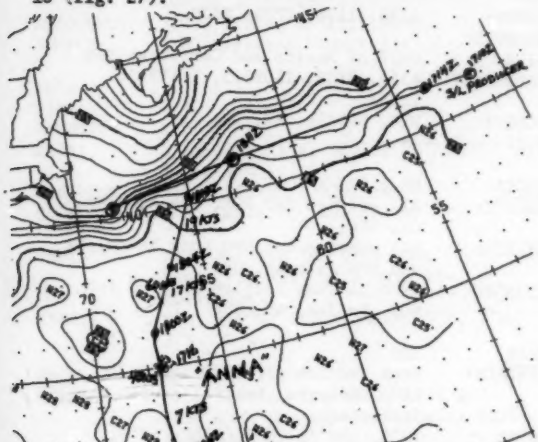


Figure 27.— Tracks of the SEA-LAND PRODUCER and Anna.

Early during the 4 to 8 watch (+3 zone) on July 18 the wind increased rapidly from the south and band after band of heavy rain showers passed over the ship. The shower bands were about 5 mi deep and roughly 20 mi long on the ship's 3-cm radar. The lines of showers kept appearing ahead of the ship as they traveled west.

At 0730 ship's time the radio operator received a message update on ANNA. The storm had speeded up to 17 kn during night and changed course to 020°. There was also a message from the ship-routing service recommending a southerly course to avoid the center of the storm.

This presented the master with two options, changing course to avoid the center or maintaining a westerly course. Using the new data on the storm, the ship should intercept the center at about noon GMT. However, tropical weather systems frequently change course and speed. If it curves a bit more eastward the ship could plow into the center on the recommended southerly course. A southerly course would also put the ship in the "dangerous semicircle" (right semicircle along the storm's track) and pounding into head-on seas. This would require an immediate reduction of speed keeping the ship in the storm longer. One final point, the ship was in the cooler water and the storm was over the Gulf Stream. Some storms recurve to the east in this area and they also tend to weaken over cooler water.

Taking everything into consideration the master chose to maintain the west course and full sea speed. The wind continued to increase from the south from 4am (zone time) until about 2pm reaching force 10 (48-55 knots) near the center of the storm. The vessel rolled, but didn't pound, and only about 10 percent of the speed was lost during this period.

The wind shifted abruptly to the north and diminished until about 4pm when there was little wind and confused sea and swell.

This story illustrates the many decisions a master has to make related to weather each day. Whether the master gets his weather information from CW, facsimile, a ship routing company, or from all three, the basic weather observations from ships is where all of the weather forecasts start. All of the weather observations received by the National Weather Service through the U.S. Coast Guard, INMARSAT, or commercial radio stations goes to the National Meteorological Center where the data is used by large capacity computers to develop sophisticated data fields and analyses. These, and all the observations we receive are made available to the ship routing companies and other commercial facilities that develop specialized products and services.

We wish to thank Mr. Vecchione for sharing his experience with us. If you wish to contribute stories, photographs, or just ask a question look on the last page of this magazine for the address of you PMO. We are always happy to receive mail.

SPECIAL NOTICE

REQUEST FOR SPECIAL OBSERVATIONS IN THE TROPICAL PACIFIC

TOGA, the Tropical Oceans and Global Atmosphere Program, is a 10-year project to study interannual climate variability. Dramatic changes in year-to-year climate behavior have been linked to oceanic temperature signals, the strongest being the extreme warming in the surface layers of the Pacific known as El Nino. Extreme El Nino events occur on an irregular basis, every 3 to 7 years, the last event occurring in 1982-83. That event was the most dramatic on record, with temperatures in parts of the equatorial central Pacific rising to more than 5 degrees C above normal. The effects of the '82-'83 El

Nino on the global weather patterns were devastating. Among the effects were drought-related brush fires in Australia, typhoons in French Polynesia and Hawaii, flooding along coastal South American and California, and drought in southern Peru and Bolivia.

There are indications that temperatures are now running as much as 1 degree to 2 degrees above normal over parts of the equatorial Pacific. However, there remain vast areas of the tropical Pacific for which there are too few observations for accurate documentation of the sea surface temperature changes.

THE TOGA PROJECT REQUESTS VESSELS OF THE MERCHANT MARINE TRAVERSING THE TROPICAL PACIFIC TO TRANSMIT IN REAL TIME AS MANY OF THEIR ROUTINE OBSERVATIONS AS POSSIBLE, PARTICULARLY OF SEA SURFACE TEMPERATURE AND SURFACE WIND.

Tips to the Radio Officer

Julie L. Houston
National Weather Service, NOAA
Silver Spring, MD

CORRECTIONS TO WORLDWIDE MARINE WEATHER BROADCASTS (January 1985 Edition)

PAGE	8
ADD:	KEC63 - Detroit, KIH29 - Flint and label triangle next to Marquette, Houghton to NOAA Weather Radio Network Map.
PAGE	12
CHANGE:	Detroit to Ann Arbor in first paragraph
PAGE	64
DELETE:	KOK from North Pacific East, Los Angeles, California
DELETE:	NMQ Long Beach, CA and NMW Astoria, OR from USA Section.
PAGES	67 - 70
DELETE:	All Frequencies for 0030 WLO and Replace with the following:
FREQUENCY:	4257.5, 6446, 8474.5, 12704.5, 17172.4 and 22320.
ADD:	
TIMES:	0130; 0930; 1530 (F) 4285, 6491.5, 8440, 12874, 16948.5, 22387; 2030 (F) 4285, 6491.5, 8440, 12874.
PRODUCT:	S,F
AREA:	Nova Scotia Coastal and Offshore Waters.
FREQUENCY(F):	4285, 8440, 6491.5
SOURCE:	VCS, Halifax, NS, Canada
FIG:	9
DELETE:	Entire entry for 1230 WLO, Mobile, AL, USA.
ADD:	
TIMES:	1400
PRODUCT:	F
AREA:	Gulf of Mexico and Caribbean Sea.
FREQUENCY:	4257.5, 6446, 8474.5, 12704.5, 17172.4 and 22320.
SOURCE:	WLO, Mobile, AL, USA
FIG:	10
ADD:	
TIMES:	0530, 1130, 1730, 2330
PRODUCT:	F
AREA:	Gulf of Mexico and Caribbean Sea.
FREQUENCY:	4352, 8707, 13083.5, 17199.5, 22588.
SOURCE:	WLO, Mobile, AL, USA
FIG:	10
PAGES:	86 & 87
DELETE:	All entries for KOK, Los Angeles, CA, USA.
DELETE:	All entries for NMQ Long Beach, CA and NMW Astoria, OR.
CHANGE:	1930 in Time Section to 2000 for NOJ, Kodiak, AL, USA
PAGE:	180
REPLACE:	Area Section for 0030 and 0630 AXM, Canberra, Australia with the following:
AREA:	10°S, 100°E; 10°S, 180°; 50°S, 100°E; 50°S, 180°.
ADD:	
TIME:	0045
PRODUCT:	W(18)
AREA:	10°S, 100°E; 10°S, 180°; 50°S, 100°E; 50°S, 180°.
FREQUENCY:	5100, 11030, 13920, 19690
SOURCE:	AXM, Canberra, Australia
REPLACE:	Area Section for 1030 and 0230 AXM, Canberra, Australia with the following:
AREA:	10°S, 90°E; 10°S, 170°E; 55°S, 90°E; 55°S, 170°E.
REPLACE:	Area Section for 0145 AXM, Canberra, Australia with the followign:
AREA:	S of 0°; 70°E; 0°, 150°W.
REPLACE:	43°S in Area Section for 0245 AXM, Canberra, Australia to 42°S.
ADD:	
TIME:	0330; 0430 (P) P(00)
PRODUCT(P):	A(00)

AREA: 10°S, 100°E; 10°S, 180°; 50°S, 100°E; 50°S, 180°.
FREQUENCY: 5100, 11030, 13920, 19690
SOURCE: AXM, Canberra, Australia

ADD:
TIME: 0045
PRODUCT: P(00)
AREA: 5°N, 52°E; 5°N, 128°; 22°S, 0°; 22°S, 180°.
FREQUENCY: 5100, 11030, 13920, 19690
SOURCE: AXM, Canberra, Australia

CHANGE: W(12) in Product Section for 0630 AXM, Canberra, Australia to W(06).

ADD:
TIME: 0645
PRODUCT: W(00)
AREA: 10°S, 100°E; 10°S, 180°; 50°S, 100°E; 50°S, 180°.
FREQUENCY: 5100, 11030, 13920, 19690
SOURCE: AXM, Canberra, Australia

ADD:
TIME: 0730
PROUCT: A(00)
AREA: 5°N, 52°E; 5°N, 128°E; 22°S, 0°; 22°S, 180°.
FREQUENCY: 5100, 11030, 13920, 19690
SOURCE: AXM, Canberra, Australia

REPLACE: Area Section for 0745 AXM, Canberra, Australia with the following:
AREA: 8°N, 160°W; 7°S, 154°E; 39°S, 8°W; 7°S, 78°W.

PAGE 181
REPLACE: Area Section for 0830, 1430 and 1530 AXM, Canberra, Australia with the following:
AREA: 10°S, 90°E; 10°S, 170°E; 55°S, 90°E; 55°S, 170°E.

REPLACE: 43°S in Area Section for 0930 and 1445 AXM, Canberra, Australia to 42°S.

ADD:
TIME: 1015
PRODUCT: P(00)
AREA: 29°N, 96°E; 36°N, 142°E; 42°S, 110°E; 36°S, 157°E.
FREQUENCY: 5100, 11030, 13920, 19690
SOURCE: AXM, Canberra, Australia

ADD:
TIME: 1030, 1045
PRODUCT: A(00)
AREA: S Hemisphere.
FREQUENCY: 5100, 11030, 13920, 19690
SOURCE: AXM, Canberra, Australia

REPLACE: Area Section for 1115 AXM, Canberra, Australia with the following:
AREA: 23°N, 100°E; 23°N, 180°E; 23°S, 100°E; 23°S, 180° (Tuesday).

REPLACE: Area and Product Section for 1145 AXM, Canberra, Australia with the following:
PRODUCT: W(06)
AREA: 10°S, 100°E; 10°S, 180°; 50°S, 100°E; 50°S, 180°.

REPLACE: Area Section for 1230 AXM, Canberra, Australia with the following:
AREA: 10°S, 100°E; 10°S, 180°; 50°S, 100°E; 50°S, 180°.

ADD:
TIME: 1245, 1330
PRODUCT: P(12)
AREA: S Hemisphere.
FREQUENCY: 5100, 11030, 13920, 19690
SOURCE: AXM, Canberra, Australia

ADD:
TIME: 1345
PRODUCT: P(00)
AREA: 5°N, 52°E; 5°N, 128°E; 22°S, 0°; 22°S, 180°.
FREQUENCY: 5100, 11030, 13920, 19690
SOURCE: AXM, Canberra, Australia

TIME: 1545; 1645 (P) P(12)
PRODUCT(P): A(12)
AREA: 10°S, 100°E; 10°S, 180°; 50°S, 100°E, 50°S, 180.
FREQUENCY: 5100, 11030, 13920, 19690
SOURCE: AXM, Canberra, Australia

ADD:
TIME: 1815
PRODUCT: A(12)
AREA: 5°N, 52°E; 5°N, 128°E; 22°S, 0°; 22°S, 180°.
FREQUENCY: 5100, 11030, 13920, 19690
SOURCE: AXM, Canberra, Australia

PAGE 182
REPLACE: Area Section for 1830 and 1845 AXM, Canberra, Australia with the following:
AREA: 10°S, 100°E; 10°S, 180°; 50°S, 100°E; 50°S, 180°.

ADD:
TIME: 1930
PRODUCT: WP(12)
AREA: S Hemisphere.
FREQUENCY: 5100, 11030, 13920, 19690
SOURCE: AXM, Canberra, Australia

ADD:
TIME: 1940
AREA: S Hemisphere (Summer only).
FREQUENCY: 5100, 11030, 13920, 19690
SOURCE: AXM, Canberra, Australia

REPLACE: Area Section for 2015 AXM, Canberra, Australia with the following:
AREA: 8°N, 160°W; 7°S, 154°E; 39°S, 8°W; 7°S, 78°W.

REPLACE:	Area Section for 2030 AXM, Canberra, Australia with the following:
AREA:	10°S, 90°E; 10°S, 170°E; 55°S, 90°E; 55°S, 170°E.
ADD:	
TIME:	2045
PRODUCT:	P(12)
AREA:	10°S, 100°E; 10°S, 180°; 50°S, 100°E; 50°S, 180°.
FREQUENCY:	5100, 11030, 13920, 19690
SOURCE:	AXM, Canberra, Australia
CHANGE:	43°S in Area Section for 2115 AXM, Canberra, Australia to 42°S.
ADD:	
TIME:	2130
PRODUCT:	P(12)
AREA:	29°N, 96°E; 36°N, 142°E; 42°S, 110°E; 36°S, 157°E.
FREQUENCY:	5100, 11030, 13920, 19690
SOURCE:	AXM, Canberra, Australia
ADD:	
TIME:	2215; 2230 (P) A(12); 2240 (P) P(00); 2250 (P) P(12)
PRODUCT(P):	A(12)
AREA:	S Hemisphere.
FREQUENCY:	5100, 11030, 13920, 19690
SOURCE:	AXM, Canberra, Australia
PAGE	187
DELETE:	South Pacific Ocean, Australia, AXM, Canberra
PAGE	197
DELETE:	All entries for AXM, Canberra, Australia

NOTES FOR THE RADIO OFFICER
J.W. Nickerson

We have had several letters from INMARSAT equipped ships complaining that their weather reports are not getting into the NWS system and being reported in the MWL. You are correct. Fortunately, most of the errors have been found in the message copies you have sent with the "Ship's Weather Observations."

The INMARSAT message handling is completely automated and the computers only play by their rules which have been printed in the last two MWL's. They are:

INMARSAT Charges

There has been a report of a company being charged for a ship weather report that was sent in by INMARSAT. Officials at COMSAT, the U.S. INMARSAT representative, say that no ship or company following our stated procedures should be charged for weather reports. However, if such a thing occurs, the company should return the invoice to COMSAT for adjustment.

We have not identified the specific circumstances; however, there are a few possibilities:

- Only the United States, Great Britain, France, and Singapore have programs to pay for ship weather reports. Sending a weather message to other countries may result in a charge to the company.
- The weather message may have been sent as a continuation of another message that normally requires a charge. Weather messages should be sent as an individual message.
- Or, it could have been a clerical goof. In any case, COMSAT is willing to work with you and NWS on any billing problems.

INMARSAT Weather Reports

The correct procedure to send a ship weather report is as follows:

1. Select U.S. Coast Earth Station identification code 01.
2. Select routine priority.
3. Select duplex telex channel.
4. Initiate the call.
5. Upon receipt of GA+ (Go Ahead), select Code 41+.
6. The response will be our answerback, NWS OBS MHTS, which will appear on your screen.
7. Send your call and weather message. End the message with 5 periods.

You should NOT have any preamble, your answerback number, or your ship's name after the GA+. Your screen or message copy should look like this:

GA+
41+
NWS OBS MHTS
WLXX 29003 99131 70808 42998 60909
22234 20201 30000 .....

The GA+ and NWS OBS MHTS are answerbacks, the rest you add.

Charges for the INMARSAT (and radio) ship weather reports are made automatically to the U.S. National Weather Service. No other action is required by either the ship or the company.

WHY YOUR INMARSAT WEATHER REPORT GOES WRONG

You will be charged for an INMARSAT message that is not addressed 41+ and to the U.S., U.K. (Great Britain), France, or Singapore. Of course you should also be in their respective forecast areas.

Your message is not going to go through the system if it is not addressed correctly, particularly in the U.S.

When you get the "Go ahead", GA+, you should respond with, 41+. Everyone seems to do well up to this point. Then there is the response "NWS OBS MHTS". This is the address of the NWS computer -- there is no human intervention. The next thing the computer expects is your call sign followed by the numbers of the weather message -- that is all! If you send anything else the computer rejects your total message and goes on to the next message from some other ship.

Some ships have resorted to sending the

message twice. This just takes additional time, but neither message will get through unless the heading is correct. Please check your message against the above message format. We need your reports.

NEW FACSIMILE SCHEDULES

(NPM) NAVAL WESTERN OCEANOGRAPHY CENTER PEARL HARBOR
EFFECTIVE 22 OCT 85

$KED TIME	PRODUCT	V/T	AREA	CHT
0000/----	FFAX BROADCAST SCHEDULE	---/---	/	01/--
----/1200	500MB 96HR PROG (EPAC)	--/00	8	--/48
-----/1214	SFC 96HR PROG (EPAC)	--/00	8	--/47
0028/1228	400MB 24HR PROG (UPAC)	12/00	1	02/48
0042/1242	400MB 24HR PROG (EPAC)	12/00	8	03/48
0056/1256	700MB 24HR PROG (UPAC)	12/00	1	04/48
0110/1310	700MB 24HR PROG (EPAC)	12/00	8	05/51
0124/1324	500MB 24HR PROG (UPAC)	12/00	1	06/52
0138/1338	500MB 24HR PROG (EPAC)	12/00	8	07/53
0152/1352	850MB 24HR PROG (UPAC)	12/00	1	08/54
0206/1406	850MB 24HR PROG (EPAC)	12/00	8	09/55
0220/1420	250MB 24HR PROG (UPAC)	12/00	1	10/56
0234/1434	250MB 24HR PROG (EPAC)	12/00	8	11/57
0248/1448	SFC 48HR PROG (UPAC)	12/00	1	12/58
0302/1502	SFC 48HR PROG (EPAC)	12/00	8	13/59
0316/1516	SFC PRELIM ANAL (UPAC)	00/12	1	14/60
0330/1530	SFC PRELIM ANAL (EPAC)	00/12	8	15/61
0344/1544	500MB SL 24HR PROG (NH)	12/00	3	16/62
0358/1558	400MB 24HR PROG (POLAR)	12/00	9	17/63
0414/1614	GOES C-SECTOR (IR)	04/12	HC	18/64
0428/1628	SFC FINAL ANAL (POLAR)	00/12	9	19/65
0443/C---	TEST CHART	--/---	/	--/--
-----/1643	SFC 72HR PROG (UPAC)	--/00	1	--/66
0502/----	500MB SL 72HR PROG (NH)	00/---	3	21/--
-----/1702	SFC 72HR PROG (EPAC)	--/00	8	--/67
0516/1716	SFC FINAL ANAL PT1 (EPAC)	00/12	4	22/68
0540/-----	SST ANAL (SOCAL) WED/FRI/SUN	00/---	7	23/--
0540/-----	SST ANAL (NOCAL) TUES/THUR/SAT	00/---	8	24/--
0540/-----	SEVEN DAY STORMTRACK MON	--/---	11	23/--
-----/1740	GOES C-SECTOR (VIS)	1730Z	HC	--/69
0558/1758	SFC FINAL ANAL PTE (UPAC)	00/12	5	24/70
0620/1820	TROPICAL WRNG OR OPEN PERIOD	--/---	/	--/--
0630/----	SST ANAL (UPAC)	00/---	1	25/--
0644/----	SST ANAL (EPAC)	00/---	2	26/--
-----/1838	500MB 72HR PROG (UPAC)	--/00	1	--/71
-----/1844	500MB 72HR PROG (EPAC)	--/00	2	--/72
0658/1858	SFC 12HR PROG (UPAC)	12/00	1	27/73
0712/1912	SFC 12HR PROG (EPAC)	12/00	2	28/74
0726/1926	500MB 12HR PROG (UPAC)	12/00	1	29/75
0740/1940	500MB 12HR PROG (EPAC)	12/00	2	30/76
0754/1954	SIG WX M VISUAL ANAL (EPAC)*	0812	HC	31/77
0808/2008	SFC 36HR PROG (UPAC)	12/00	1	32/78
0822/2022	SFC 36HR PROG (EPAC)	12/00	2	33/79
0836/2036	SIG WX 12HR PROG (UPAC)*	12/00	1	34/80
0850/2050	SIG WX 12HR PROG (EPAC)*	12/00	2	35/81
0904/2104	SFC PRELIM ANAL (UPAC)	00/12	1	36/82
0918/2118	SFC PRELIM ANAL (EPAC)	00/12	2	37/83
0932/2132	500MB 36HR PROG (UPAC)	12/00	1	38/84
0946/2146	500MB 36HR PROG (EPAC)	12/00	2	39/85
1000/2200	SIG WX 36HR PROG (UPAC)*	12/00	1	40/86
1014/2214	SIG WX 36HR PROG (EPAC)*	12/00	2	41/87
1028/2228	HORIZ WEAX DPCTN 24HR PROG	00/12	6	42/88
1051/2251	SFC FINAL ANAL PT1 (EPAC)	00/12	4	43/89
1113/2313	SFC FINAL ANAL PT2 (UPAC)	00/12	5	44/90
1135/2335	SFC PRES 36HR PROG (POLAR)	12/00	9	45/91
1149/2349	TROPICAL WRNG OR OPEN PERIOD	--/---	/	--/--

*ARROW HEADS INDICATE PRIMARY DIRECTION
ARROW TAILS INDICATE SECONDARY DIRECTION

1. TRANSMISSION FREQUENCIES:
   A. PEARL HARBOR 2122 USB — 0600-1600Z
   4855 LSB/ISB — CONTINUOUS
   9396 USB/ISB — CONTINUOUS
   14826 USB/ISB — CONTINUOUS
   21937 USB/ISB — 1700-0630Z
   B. ADAX 8494 USB — CONTINUOUS

2. AREAS:
   A. CHART PROJECTION ASSUMES A 19 INCH RECORDER.
   (1) MERCATOR 1 TO 13M, 80N - 05N, 103E - 168W.
   (2) MERCATOR 1 TO 12M, 60N - 05N, 165W - 093W.
   (3) POL STER 1 TO 38M, NORTHERN HEMISPHERE.
   (4) MERCATOR 1 TO 16M, 58N - 10N, 178W - 111W.
   (5) MERCATOR 1 TO 10M, 58N - 05S, 120E - 173W.
   (6) MERCATOR 1 TO 15M, 60N - 13S, 115E - 105W.
   (7) POL STER 1 TO 8M, UL 28N 137W, UR 45N 119W.
   LL 15N 122W, LR 26N 105W.
   (8) POL STER 1 TO 5M, UL 41N 157W, UR 65N 143W.
   LL 31N 138W, LR 47N 110W.
   (9) POL STER 1 TO 10M, UL 65N 163W, UR 80N 082W.
   LL 32N 166E, LR 31N 142W.
   (10) MERCATOR 1 TO 13M, 80N - 05N, 177E - 107W.
   (11) MERCATOR 1 TO 20M, 80N - EQ, 165E - 116W.

COMMENTS CONCERNING FFAX QUALITY/CONTENT ARE SOLICITED.
ADDRESS COMMENTS TO:

NAVAL WESTERN OCEANOGRAPHY CENTER
BOX 113
PEARL HARBOR, HI 96860-5050

****

GFAX BROADCAST SCHEDULE
EFFECTIVE 15 MAY 85

START (Z)	BASE TIME PRI	DESCRIPTION	AREA
0000/----		OPEN	
0015/	00Z 4	96 HR SFC PROG (NUPAC)	1
/1200	4	GFAX BCST SKED (PART 1 OF 2)	
/1215	4	GFAX BCST SKED (PART 2 OF 2)	
0030/1230	12/00Z 1	24 HR 850 MB PROG (SCS)	8
0045/1245	12/00Z 1	24 HR 700 MB PROG (SCS)	8
0100/1300	12/00Z 1	24 HR 500 MB PROG (SCS)	8
0115/1315	12/00Z 1	24 HR 400 MB PROG (SCS)	8
0130/1330	12/00Z 1	24 HR 300 MB PROG (SCS)	8
0145/1345	12/00Z 1	24 HR 200 MB PROG (SCS)	8
0200/1400	12/00Z 1	24 HR SFC PROG (SCS)	8
0215/1415	12/00Z 1	24 HR 850 MB PROG (IO)	9
0230/1430	12/00Z 1	24 HR 700 MB PROG (IO)	9
0245/1445	12/00Z 1	24 HR 500 MB PROG (IO)	9
0300/1500	00/12Z 1	*TROPICAL WRNG/OPEN	
0315/1515	12/00Z 1	24 HR 400 MB PROG (IO)	9
0330/1530	12/00Z 1	24 HR 300 MB PROG (IO)	9
0345/1545	12/00Z 1	24 HR 200 MB PROG (IO)	9
0400/1600	12/00Z 1	24 HR SFC PROG (IO)	9
0415/1615	00/12Z 1	NUPAC PRELIM SFC ANAL	1
0430/1630	3	*TROP STORM TRACK (MON/THUR)	3
	3	*EX TROP STORM TRACK (TUE/FRI)	4
	3	BCST QUALITY MSG (WED)	
	3	*NUPAC OCEAN SYNOPSIS (SAT/SUN)	4
0450/		SAT SUPPORT/OPEN	
/1650	4	*MTEM SST ANAL (TUE/FRI)	7
0505/		CLIMATOLOGY/OPEN	
/1705	1	SST ANAL (NUPAC)	1
0520/1720	00/12Z 1	*ASIO FINAL SFC ANAL (IO)	8
0535/1735	00/12Z 1	*ASPM FINAL SFC ANAL (NUPAC)	4
0555/1755	00/12Z 1	*ASPS FINAL SFC ANAL (SUPAC)	2
0615	00/12Z 2	*FJBI 24 HR SIG WX PROG	7
0635	00/12Z 1	*MSEH SIG WAVE HT ANAL	7
/1815	00/12Z 1	*MSEH SIG WAVE HT ANAL	7
/1835	00/12Z 2	*FJBI 24HR SIG WX PROG	7
0655/1855	00/12Z 1	850 MB ANAL (NUPAC)	1
0710/1910	00/12Z 1	24 HR SFC PROG (NUPAC)	1
0725/1925	00/12Z 1	500 MB ANAL (NUPAC)	1
0740/1940	00/12Z 1	36 HR SFC PROG (NUPAC)	1
0755	TEMPORARY	MLD IN METERS	
/1955	TEMPORARY	TOPS MLD BLW	
0810/2010	00/12Z 1	48 HR SFC PROG (NUPAC)	1
0825/2025	00Z 1	72 HR SFC PROG (NUPAC)	1
0840/2040	00/12Z 1	300 MB ANAL (NUPAC)	1
0855/2055	00/12Z 1	*TROPICAL WRNG/OPEN	
0905/2105	00/00Z 1	200 MB ANAL	1
0920/2120	00/00Z 1	72 HR 500 MB PROG (NUPAC)	1

START (Z)	BASE TIME PRI	DESCRIPTION	AREA
0935/2135	00/12Z 1	36 HR 850 MB PROG (NUPAC)	1
0950/2150	00/12Z 1	36 HR 700 MB PROG (NUPAC)	1
1005/2205	00/12Z 1	36 HR 500 MB PROG (NUPAC)	1
1020/2220	00/12Z 1	36 HR 400 MB PROG (NUPAC)	1
1035/2235	00/12Z 1	36 HR 300 MB PROG (NUPAC)	1
1050/2250	00/12Z 1	36 HR 200 MB PROG (NUPAC)	1
1105/2305	00/12Z 1	NUPAC PRELIM SFC ANAL	1
1120/2320	00/12Z	OPEN/N. HEMI 500MB SL ANAL	
		36 HR N. HEMI 500MB SL PROG	
1140/2340	00/12Z 1	*MSPN 36HR SIG WAV PROG (NUPAC)	1

*INDICATES FLATBED PRODUCT

ANY OPEN TIME SLOT IS AVAILABLE FOR SPECIAL SUPPORT

AREA 1 MERCATOR 1 30M — AREA 6 MERCATOR 1 30M
UL 60N,100E UR 60N,175E — UL 20N,30E UR 20N,160E
LL 05N,100E LR 05N,175E — LL 45S,30E LR 45S,160E

AREA 2 MERCATOR 1 15M — AREA 7 MERCATOR 1 30M
UL 10N,95E UR 10N,180 — UL 60N,20E UR 60N,180
LL 45S,95E LR 45S,180 — LL 47S,20E LR 47S,180

AREA 3 POLAR 1 30M — AREA 8 MERCATOR 1 30M
UL 40N,10E UR 39N,170W — UL 50N,090E UR 50N,163E
LL 07S,70E LR 07S,125E — LL 10S,090E LR 10S,163E

AREA 4 MERCATOR 1 15M — AREA 9 MERCATOR 1 30M
UL 60N,95E UR 60N,180 — UL 60N,30E UR 60N,105E
LL 05N,95E LR 05N,180 — LL 10S,30E LR 10S,105E

AREA 5 MERCATOR 1 15M — AREA 10 MERCATOR 1 30M
UL 36N,30E UR 36N,100E — UL 60N,90E UR 60N,165E
LL 27S,30E LR 27S,100E — LL 05N,90E LR 05N,165E

TRANSMISSION FREQUENCIES (KHZ)
GUAM 4975, 7894 10255, 15990, 19860, 23964
PHILIPPINES 10966, 13395, 3377.5 (1000-2200),
8286E (2200-1000)
JAPAN 12777
DIEGO GARCIA 8506 (2000-0200), 10290 (0000-0400),
12824 (0200-0900), 20300 (0400-2000)
M. E. WOLT 17060 (2200-1000), 9408.5 (1000-2200), 12873.5

COMMENTS CONCERNING GFAX QUALITY AND CONTENT ARE SOLICITED.
ADDRESS COMMENTS TO:

NAVAL OCEANOGRAPHY COMMAND CENTER
BOX 12
FPO SAN FRANCISCO 96630

OPEN SLOTS CAN BE TEMPORARILY FILLED WITH SPECIAL SUPPORT
EFFECTIVE DATE: 15 MAY 85

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UNCLASSIFIED PAGE 1 OF NFAX/NO/MD08

NAVAL EASTERN OCEANOGRAPHY CENTER, NORFOLK, VIRGINIA
REVISED NFAX BROADCAST SCHEDULE
EFFECTIVE 21 JAN 86

TOT (Z)	TRANSMISSION CONTENT	V.T.
0000/1200	500MB HT/TEMP/WIND 24HR PROG	12/00
0015/1215	400MB HT/TEMP/WIND 24HR PROG	12/00
0030/1230	300MB HT/TEMP/WIND 24HR PROG	12/00
0045/1245	200MB HT/TEMP/WIND 24HR PROG	12/00
0100/1300	GOES SATELLITE PICTURE	
0115	NMC EXTENDED SFC/UA PROG	
1315	NMC 200MB TROP ANAL	/00
0135	SST GULF STREAM ANAL FULL (TUE/SAT)	
	TSGS (SUN/THURS)	
1335	NFAX SCHEDULE (MON,WED,FRI)	
	SST GULF STREAM ANAL I (MON)	
	PLD (TUES/FRI)	
	OPEN PERIOD (WED/THURS/SAT/SUN)	
0150	TSNS (MON/FRI)	
	TSIB (TUES/SAT)	
	OPEN PERIOD (SUN/WED/THURS)	
1350	SEA TEMP ANAL (MON/THURS)	
	TSNF (TUES/SAT)	
	NMC TROP ANAL (SUN/WED/FRI)	/00
0205/1405	500MB HT/TEMP/WIND 48HR PROG	12/00
0220/1420	FREEZING LVL 24HR PROG	12/00
0235/1435	NMC RADAR SUMMARY	
0245/1445	GOES SATELLITE PICTURE	
0300/1500	NMC SIG WX 12 HR PROG (SFC-400MB)	12/00
0310/1510	NEOC 36HR PROG BLEND	00/12
0325/1525	OPEN PERIOD	
0335/1535	NMC 24HR 500MB HT CHANGE	00/12
0350/1550	NEOC MEPHANALYSIS	
0410/1610	NMC RADAR SUMMARY	
0420/1620	NEOC NLANT SFC PRES ANAL	00/12
0435/1635	NMC LFM 24HR PROG	00/12
0450/1650	OPEN PERIOD	
0500/1700	DMSP SATELLITE PICTURE	
0515/1715	SFC TROP PRES/WIND ANAL	
0530/1730	BRACKNELL 24HR SFC PROG	00/12
0545/1745	GOES SATELLITE PICTURE	
0600/1800	NMC LFM 48HR PROG	00/12
0615	NMC RADAR SUMMARY	
0620	OPEN PERIOD	
1815	NEOC SEA HEIGHT ANAL	/12
0635/1835	850MB HT/TEMP/WIND ANAL	00/12
0650/1850	700MB HT/TEMP/WIND ANAL	00/12
0705/1905	500MB HT/TEMP/WIND ANAL	00/12
0720/1920	300MB HT/TEMP/WIND ANAL	00/12
0735/1935	NMC RADAR SUMMARY	
0740/1940	SFC PRES/WIND 12HR PROG	00/12
0755/1955	SFC PRES/WIND 24HR PROG	00/12
0810/2010	OPEN PERIOD	
0820/2020	NMC 24HR SIG WX	00/12
0830/2030	NMC 36/48HR SIG WX	
0840/2040	NMC RADAR SUMMARY	
0845/2045	DMSP SATELLITE PICTURE	
0900/2100	NMC ANAL TROP OCEAN LWR LYR	00/12
0915/2115	OPEN PERIOD	

The Editor's Desk

SEVERE WINTER FLOOD DAMAGE PREDICTED FOR GREAT LAKES

Record-breaking high water levels in three of the Great Lakes may bring millions of dollars in flood and erosion damage along their shorelines this winter, the Commerce Department's National Oceanic and Atmospheric Administration (NOAA) predicts.

Frank Quinn, head of the hydrology group at NOAA's Great Lakes Environmental Research Laboratory, Ann Arbor, Mich., said levels in lakes Superior, Michigan, Huron, and St. Clair, were higher last month than in any October on record. He expects also November levels to reach record highs (fig. 28).

DECEMBER MEAN LAKE LEVELS

	Superior	Mich.-Huron	St. Clair	Erie	Ontario
1985	601.81	580.68	575.95	572.74	244.85
1984	601.08	579.62	574.68	571.34	243.89
MAX. YEAR	601.53 1974	579.97 1973	575.21 1972	572.35 1972	246.19 1945
MIN. YEAR	598.94 1925	575.40 1964	571.05 1925	567.53 1934	241.48 1934
1900-1984 AVG.	600.61	577.99	573.08	569.92	244.01

Figure 28.-- Mean lake levels, December, 1985. 1985 figures are provisional. From Monthly Bulletin of Lake Levels For The Great Lakes, Corps of Engineers.

High water levels in the fall and winter months endanger lakefront property during destructive Great Lakes' storms. In 1973, extreme high water levels caused hundreds of millions of dollars of flood and erosion damage to shoreline interests.

The high levels are caused primarily by heavy rainfall during September and October on the upper lakes -- ranging as high as 50 percent above normal in some areas -- coupled with near-record summer water levels, Quinn said.

Lake levels last spring equalled or exceeded the previous record high 1973 readings on lakes Michigan, Huron and St. Clair.

Emergency action last spring and summer by the International Joint Commission on the Great Lakes reduced the flow of water from Lake Superior, resulting in lowering in lakes Michigan, Huron, St. Clair and Erie, but a rise in Lake Superior.

Controlling the flow from Superior, Quinn said, is the only viable way to reduce lake levels, influenced mainly by precipitation and air temperature. In the last 15 years, annual precipitation in the Great Lakes Basin has been consistently high. Several warmer periods last winter caused precipitation to fall as rain rather than snow, giving a faster runoff into the lakes and elevating their levels.

AMVER WILL PLOT OPERATION SAIL '86 TALL SHIPS

The U.S. Coast Guard's AMVER Center in New York City has agreed to carry on plot the "tall ships" participating in next year's Independence Day commemoration here on July 4.

This announcement was made December 6 at the close of a 2 day meeting in New York which brought together captains of the vessels set to sail into the Port of New York on July 4, 1986. "We are delighted to announce this agreement. AMVER once again has the chance to improve safety at sea! There are but a few 'tall ships' remaining in the world today and it is significant that AMVER will have a hand in their underway safety," said Coast Guard Captain Peter T. Muth, chief of the AMVER Center.

AMVER is the only voluntary, worldwide, mutual assistance, vessel reporting system. Information available from the AMVER System is only for search-and-rescue purposes.

COAST GUARD SLATES REPAIRS TO WESTWIND

The Coast Guard announced today that extensive repairs will be made to the cutter WESTWIND to extend the vessel's service life. WESTWIND is a 40-yr old polar icebreaker, homeported in Mobile, Alabama.

WESTWIND received significant damage to its hull while icebreaking in Antarctics in January 1984. Since returning to Mobile from the South Pole regions, Westwind has remained in a caretaker status.

Initial repairs will be accomplished at the Coast Guard Yard in Curtis Bay, Maryland. The 1985 Supplemental Appropriations Bill provided $6.24 million for this 18-month project to return WESTWIND to the icebreaker fleet.

WESTWIND currently has many engineering systems inoperative and will be towed to Curtis Bay. Piping system, plating structural members, electrical systems and all machinery will be inspected and repairs made during this project.

MARINE WEATHER REVIEW

The Weather Logs combined with the cyclone tracks, U.S. Ocean Buoy climatological data, gale and wave tables, and mean pressure patterns are a definitive report on the weather systems and primary storms which affected the North Atlantic and North Pacific Oceans during this 3-mo period. Hurricane Alley lists and describes tropical cyclones worldwide. Unless stated otherwise, all winds are sustained winds and not gusts; all times are G.M.T.

North Atlantic Weather Log
July, August and September 1985

WEATHER LOG, JULY 1985 — There were numerous storm centers that tracked over Canada as far north as latitude 80°N. Most had an easterly component in the track but they crossed each other at many angles with several looping and turning westward. Four centers crossed the Great Lakes. The majority of the cyclones that tracked over the ocean were north of latitude 50°N. Most had an east-northeast track until approximately longitude 15°W where they curved northward. Only one cyclone moved up the U.S. East Coast.

The monthly mean sea-level pressure chart was dominated by the Azores High (fig. 29) at 1027 mb normally located near 38°N, 37°W. There were two low-pressure centers, a 1006 mb near Cape Chidley and a 1007 mb just south of Iceland.

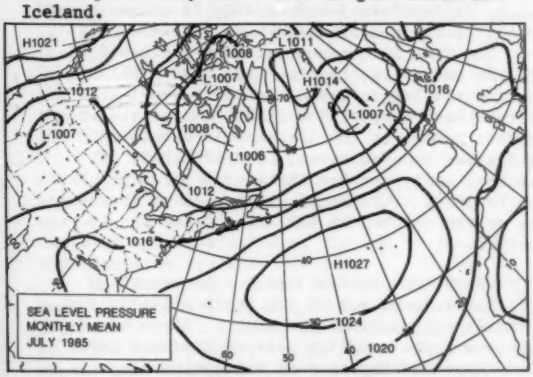


Figure 29.-- Monthly mean sea-level pressure.

The monthly mean sea-level pressure departures from normal were not large. The largest was a minus 4 mb center between Iceland and Ireland. There also was a minus 3 mb area midway between Cape Race and Kap Farvel. The largest positive area was plus 3 mb near 40°N, 49°W.

In the upper air at 700 mb the flow was primarily zonal between 40°N and 60°N across the water. There were anomalous LOWs near Resolute Bay and over Iceland. The normal trough along the U.S. East Coast was shifted westward west of the Appalachian Mountains. The usual trough west of Portugal was sharper and accentuated.

Tropical cyclones Ana and Bob formed this month.

Some climatology — On July 5, 1916 Mobile AL experienced their worst hurricane ever. Winds reached 82 mi/hr, the tide rose 11.6 ft above normal and the pressure dropped to 28.92 in (979.3 mb).

Extratropical Cyclones — The month began with a large Azores-Bermuda High over the central ocean centered near 30°N, 40°W and a LOW near 60°N, 35°W. At midweek there were two separate HIGH centers near Bermuda and the Azores. There were only weak LOWs in the north latitudes. The HIGHs drifted eastward and northeastward by the end of the week.

The second week a multicentered HIGH approximated latitude 45°N. This blocked any LOWs to over Canada and north of latitude 60°N. The situation remained basically the same until the end of week. A fairly large LOW drifted eastward and then northward from Iceland during this period.

As the third week started a 1033 mb HIGH was centered near 40°N, 35°W. A significant LOW moved eastward along the 55° to 60°N corridor. Tropical storm Ana had her beginning southeast of Bermuda. By the 20th Ana was extratropical northeast of St. Johns and tracking northeastward. The LOW over the Norwegian Sea was dissipating.

The fourth week produced high pressure cells near Bermuda, Azores, and over France. Weak LOWs were moving through the 50° to 65°N latitude corridor. By midweek the high pressure over Europe was breaking down. There were LOWs near Cape Chidley and Jan Moyen Island. At the end of the week cyclonic curvature was penetrating further south. At the end of the month high pressure was again pressing northward.

The first two weeks of the month were quiet with only isolated gale reports. The first significant storm was analyzed as a weak LOW west of James Bay on the 0000 chart of the 14th. By 0000 on the 15th the southeast quadrant of the storm was over salt water. The VCWB (50°N, 51°W) reported 37-kn south winds. At 1200 the WGZL (47°N, 49°W) reported 38-kn southwest winds. By 1200 on the 16th the storm was 984 mb near 59N, 31°W. At 1800 the ATLANTIC SERVICE (50°N, 21°W) had 39-kn southwest winds. By 1200 on the 17th the storm was 972 mb near 59°N, 18°W (fig. 30).

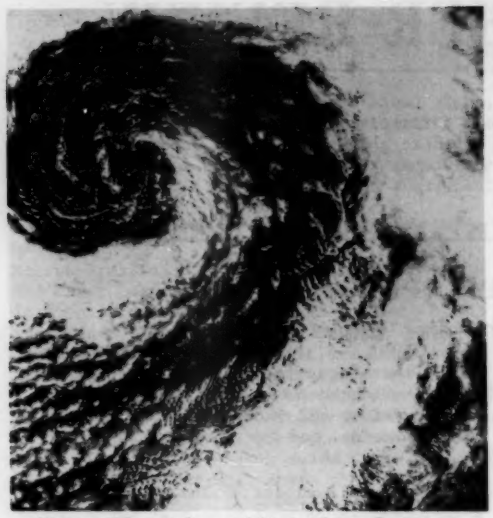


Figure 30.--Polar-orbitor view of the storm.

Figure 31.-- The analysis for 1200, 31 July.

The KOLN EXPRESS (56°N, 20°W) had 52-west-southwest winds, 28-ft seas, and 30-ft swells. The GRIMSA (56°N, 24°W) also had 52-kn winds, 13-ft seas, and 30-ft swells. At 1500 LIMA measured 40-kn northwest winds, 12-ft seas, and 20-ft swells. On the 18th the VIGILANT (58°N, 05°W) measured 44-kn south winds, 13-ft seas, and 20-ft swells.

The storm was east of Iceland on the 19th and weakening. The BERLIN at 67°N, 22°W found 40-kn north winds and 20-ft seas. The storm curved back southward on the 20th and dissipated.

Tropical storm Ana was extratropical by the 20th. At 1200 on the 19th she was over Cape Race. At 1500 the STOLT ENERGIE (45°N, 53°W) measured 43-kn southwest winds and 30-ft seas. At 2100 the ATLANTIC SERVICE (46°N, 50°W) measured 54-kn southwest winds and 20-ft seas. On the 20th at 0000 two ships near 47°N, 48°W measured winds near 45 kn and 20-ft seas. At 1200 on the 21st the storm was only 1000 mb near 53°N, 33°W, the REBEKA OMA (43°N, 24°W) had 39-kn southwest winds. On the 22d a ship near 53°N, 30°W had 40-kn winds. The storm passed over the North Sea late on the 22d.

The lee side of the Canadian Rockies produced this storm. It was not significant until it moved over water near Hopedale, Labrador on the 30th. On the 31st at 0000 it brought winds near 50 kn to the drilling platforms on the Grand Banks. At 1200 the storm was 988 mb near 56°N, 42°W (fig. 31). The DIAMOND GLORIOUS (51°N, 44°W) measured 45-kn winds, 17-ft seas, and 20-ft swells. On August 1 the FALCON (50°N, 39°W) found 37-kn winds, 13-ft seas, and 28-ft swells. A ship whose call letters were not complete near 50°N, 40°W reported 44-kn winds, 13-ft seas, and 28-ft swells. CHARLIE measured 39-kn winds and 20-ft seas. At 1200 on the 2d the storm was 984 mb near 60°N, 16°W. The CHALLENGER (63°N, 18°W) measured 44-kn winds from 060° with 20-ft seas and swells. On the 3d the ENGEY (64°N, 24°W) had 50-kn winds from the northwest. The storm broke up over the Norwegian Sea on the 4th.

Casualties — The FEDERAL HURON reported ice damage in Scoresby Sound on July 15. The SEALINK sustained ice damage in Hudson Strait.

The CARL RAY encountered heavy weather off the Ghana coast on the 5th. The COWREH sank on the 5th in turbulent weather off the Sierra Leone coast. The FINNOCEANIS sustained weather damage on the 18th and 19th between Felixstone and New Haven. The OPAL BAY reported heavy weather the middle of July. The VASILIOS G. anchored at Charleston Roads was driven aground on the 25th by heavy weather.

WEATHER LOG, AUGUST 1985 — The tracks of the cyclones across the North Atlantic was a fairly narrow band this month. There was a junction point slightly east of Newfoundland. From there the majority of the cyclones tracked northeastward with the concentration decreasing about 25°W. Three cyclones tracked across the east coast of the United States and three formed near the coast. Several storms off the primary path tracked across the United Kingdom.

The Icelandic Low was much deeper and larger than normal (fig 32). It was 1001 mb near 60°N, 14°W versus the normal of 1008 mb near 60°N, 20°W. There was another 1009 mb Low over northern Baffin Island. The Azores High was near normal at 1025 mb near 34°N, 32°W.

There were two significant anomaly centers, a minus 9 mb near 58°N, 12°W and a plus 6 mb near 57°N, 60°W.

Tropical cyclones Claudette, Danny, and Elena occurred this month.

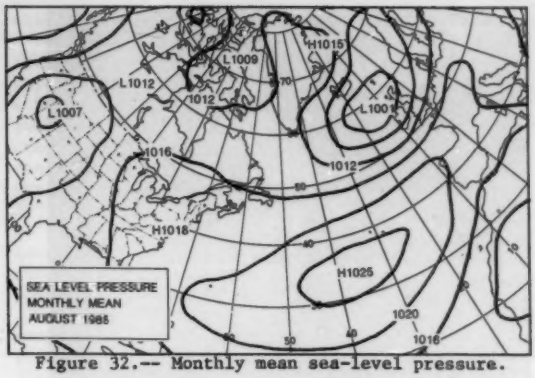


Figure 32.-- Monthly mean sea-level pressure.

Some Climotology — On August 11, 1940 a major hurricane struck Savannah GA and Charleston SC causing the worst inland flooding since 1607. On the 19th in 1788 a small hurricane inflicted great havoc along a narrow track from New Jersey to Maine. On the 26th 1883 the Krakatoa volcano exploded. The blast was heard 2,500 mi away and 36,000 persons were killed by debris and tidal waves. On the 31st in 1954 hurricane Carol swept New England killing 60 people and causing millions of dollars damage.

Extratropical Cyclones — The month started with a large 1030 mb HIGH near 35°N, 35°W and a weaker HIGH moving off Nova Scotia. The high-pressure ridge extended into Romania. A large low for the summer time was south of Iceland and a frontal wave south of Nova Scotia. The LOWs moved generally eastward as the HIGHs were quasistationary. At the end of the week only two weak LOWs along 60°N broke the high-pressure pattern.

The second week the two LOWs combined and developed into a significant storm, the strongest of the month. On the 10th Claudette was off the Carolinas. The LOW drifted eastward and dissipated by the end of the week and Claudette tracked eastward.

As Claudette tracked eastward the third week the subtropical HIGH weakened and moved southward. This allowed an extratropical LOW to drift eastward from Belle Isle. By the end of the week high pressure was building over the western third of the ocean.

The fourth week high pressure was the dominant feature from the Midwest to the Ukraine. At midweek a large LOW was centered over the Shetland Islands. At end of the week another Low was near the Faeroe Islands. At the end of the month the HIGHs had broken down and a series of LOWs were penetrating as far south as latitude 45°N.

This LOW moved off the U.S. coast near Cape Cod on August 1. By 1200 on the 2d it was 996 mb south of Argentia, Newfoundland. Reporters on the Grand Banks measured 37- to 44-kn winds with waves only up to 12 ft. The storm was racing eastward with an upper air short-wave trough. On the 3d the QUEEN ELIZABETH II was at 47°N, 33°W with 44-kn westerly winds, 25-ft

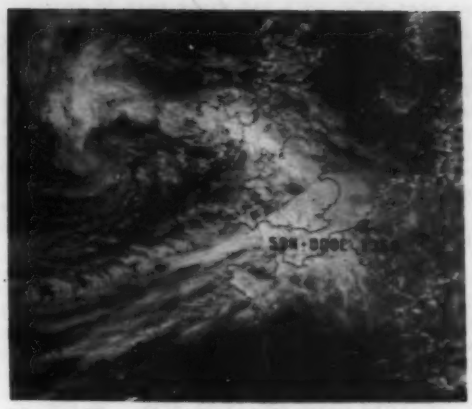


Figure 33.-- The high winds were along and behind the front. NOAA

seas, and 13-ft swells. By 1200 on the 4th the storm was over Ireland (fig. 33). The ATLANTIC CONVEYOR (46°N, 19°W) found 40-kn winds, 13-ft seas, and 30-ft swells. The FORT SAINT CHARLES (45°N, 16°W) measured 46-kn northwest winds and 20-ft seas. ROMEO had 35-kn winds and 20-ft seas that persisted into the 5th. Many platforms in the North Sea measured 35- to 45-kn winds on the 5th. The winds died out on the 6th.

The yacht MIDNIGHT FIRE was caught in storm conditions near 48°N, 09°W on the 3d. A french helicopter rescued two people.

A frontal wave was analyzed east of Cape Hatteras on the 2d. It tracked northeastward and was east of Cape Race on the 5th, still a weak cyclone. On the 6th the storm was south of Iceland at 996 mb. On the 7th and 8th the storm made a counterclockwise loop. There were a few gale reports on the 6th. On the 7th the PAV TRADER (61°N, 19°W) reported 47-kn winds from the southeast at 0000. At 1200 they were 58 kn and at 1800, 39 kn. On the 8th CHARLIE measured 39-kn winds from the west and 20-ft seas. The ANSGARITOR (51°N, 23°W) had 52-kn west winds, 20-ft seas, and 30-ft swells and continued into the 9th. The DART AMERICANA (51°N, 15°W) found 44-kn winds and 20-ft swells. On the 10th the storm was 989 mb near 58°N, 12°W. The circulation was absorbed by another cyclone on the 12th.

A LOW formed over southern Spain on the 5th. Late on the 5th the SAINT ROCH (42°N, 10°W) had 37-kn northwest winds. On the 6th a ship near 36°N, 05°W had 41-kn winds. At 1800 CORSE (43°N, 08°E) reported 55-kn north winds. On the 7th the LOW was over Romania. Early that day two ships had winds near 45-kn near Corsica. By the 8th the storm had moved too far over land to affect ships.

A frontal wave formed near Montreal on the 11th. It moved parallel to the St. Lawrence River and crossed into the Labrador Sea on the 13th. At 1200 on the 15th it was 986 mb near 53°N, 48°W. Three reporters on the Grand

Banks near 48°N, 49°W had winds near 38 kn. On the 16th the AMERICAN CONDOR (46°N, 40°W) had 36-kn winds and 15-ft waves. On the 17th the USNS MAUMEE found 45-kn northeast winds, 20-ft seas, and 30-ft swells southwest of Kap Farvel. The TFL DEMOCRACY (45°N, 36°W) reported 38-kn west winds, 21-ft seas, and 23-ft swells. On the 18th the BALTIC EAGLE (39°N, 38°W) reported 47-kn winds, and the MUSSON (50°N, 30°W) reported 25-ft seas. This LOW center dissappeared as another formed and on the 19th there were multiple centers.

A quasistationary LOW had been south of Iceland for several days. On the 23d a frontal wave in the southern quarter intensified the circulation. The SEA-LAND PRODUCER (48°N, 15°W) reported 40-kn northwest winds, 13-ft seas, and 20-ft swells. ROMEO measured 35-kn winds and 16-ft seas. On the 24th the frontal wave became the primary center near 59°N, 04°W at 982 mb. There were reports of winds up to 44-kn over the North Sea. The storm was breaking up on the 25th.

The last significant storm of the month formed off Cape Hatteras on the 22d. The ANSGARITOR (41°N, 64°W) reported 37-kn northeast winds, 16-ft seas, and 23-ft swells. The storm weakened as it moved past Newfoundland and raced northeastward. On the 26th CHARLIE measured 35-kn winds and 15-ft seas. The storm was beginning to intensify. At 1200 on the 27th it was 990 mb near 60°N, 18°W (fig. 34). Two ships near 49°N, 12°W had southerly gales. On the 28th the PACIFIC CHALLENGE (59°N, 09°W) measured 42-kn winds and 20-ft swells. The GDJZ (61°N, 03°W) measured 49-kn southwest winds and 20-ft seas. The storm was 988 mb. On the 29th the storm was north of latitude 70°N and no ship reports were received.

Casualties -- The CHEMICAL TRANSPORT reported ice damage during August-September during a voyage to the northeastern Northwest Territories. These ships had casualties because of fog: AGIP MUREX, ALHAMBRA, CHI-CHEEMAUN, FINNMERCHANT, JOHN REED, QUICKBORN, RAMDANE ABANE, AND TRIGLAV.

The IERANTO sprang a leak during a gale on the 3d near Sicily. The GLASGOW and CAPTAIN DIAMANTIS collided in force 7 to 8 winds at Piraeus.

Two freak waves driven by winds up to 65 kn hit the Provence coast of France. One woman drowned and a 12 mi stretch of beach was devastated. Two thousand people were evacuated.

The racing yacht DRUM ENGLAND capsized off the English coast during the Fastnet race. Twenty-four people were rescued, six were trapped underwater in the cabin and saved. The PORTVAG and OT-ACID were caught in rough weather on the 12th in the Baltic Sea.

On the 14th heavy thunderstorms struck northern Germany causing severe damage. The PIONEER ACE and ATLANTIC CONVEYOR were ripped from their moorings.

The KAREN encountered heavy weather the

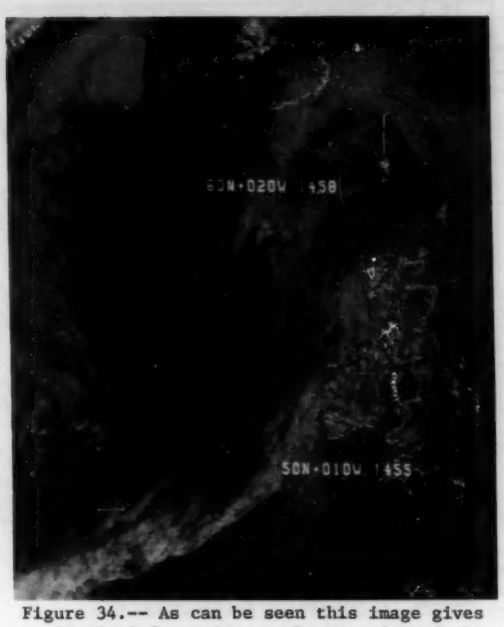


Figure 34.-- As can be seen this image gives little information on the severity of the weather on the surface. NOAA Image.

23d to 25th from Agadir to Nantes. The DOROTHEA P. had weather damage late August on voyage from Archangel to Sardinia.

Other Casualties -- The CAPE ANTIBES had heavy weather damage on the 15th during voyage from Durban to Punta Arenas. Nine containers fell into the sea. The FAJAR encountered heavy weather in the South Atlantic the 18th to 25th with damage.

WEATHER LOG, SEPTEMBER 1985 -- The cyclone tracks over water this month were spread over a wide area. There was no primary orientation of the tracks off the North American coast. At approximately longitude 30°W the tracks organized into two east to northeastward paths. The northern path was from about 60°N, 35°W to near Nordkapp. The southerly path was from near 50°N, 25°W to Scotland and then to Nordkapp. The cyclones

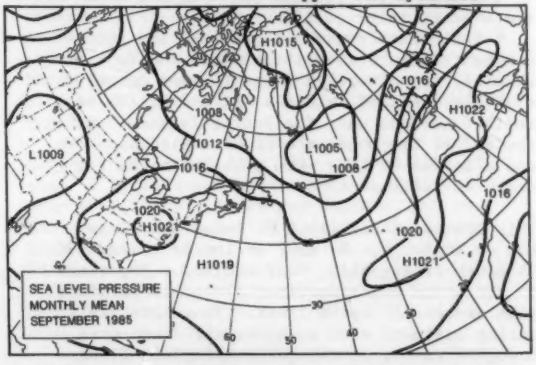


Figure 35.-- Monthly mean sea-level pressure.

along this track were during the first weeks.

There were major differences in the monthly mean sea-level pressure pattern from climatology (fig. 35). The Icelandic Low was a normal 1005 mb near 57°N, 33°W, about 200 mi south of its climatic position. There was an anomalous 1003 mb Low near Nordkapp. The Azores High was elongated eastward over Europe. There was a 1021 mb center near 34°N, 29°W near the climatic location, plus a 1022 mb center near Paris, France. There was an anomalous 1021 mb High over Virginia. The trough from the Icelandic Low as deeper and sharper than normal.

As expected there were several anomaly centers. The trough from the Icelandic Low produced a minus 5 mb center near 47°N, 32°W. The Low over Nordkapp also produced a minus 5 mb center with another near Moscow. There was a plus 6 mb center over the Brest Peninsula, a plus 3 mb over Cape Hatteras, and a plus 5 mb between Greenland and Iceland.

In the upper air at 700 mb climatology shows one Low center over northern Ellesmere Island. This month there were four LOW centers, the primary was near 80°N, 155°W, others over Davis Strait, 60°N, 35°W, and 80°N, 20°E. Also there were two small high centers over the Greenland Icecap. The LOW east of Kap Farvel produced a deep trough along longitude 40°W.

There were three tropical cyclones this month, Fabian, Gloria, and Henri.

Some Climatology -- On September 8, 1900 the greatest weather disaster in U.S. history occurred when a hurricane struck Galveston, TX. A 5-ft tide washed over the island drowning more than 6,000 persons and destroying 3,600 houses. On the 13th, 1979 hurricane Frederick hit the Mobile AL bay area with 132 mi/hr winds causing $2.3 billion damage. On the 15th, 1752 a great hurricane produced a tide along the South Carolina coast which nearly reached downtown Charleston. Just before reaching the city a wind shift dropped the water level 5 ft in 10 minutes.

Extratropical Cyclones -- The month began with hurricane Elena in the Gulf of Mexico and three LOWs in a line from Nova Scotia to Scotland. At the middle of the week the Azores High had moved eastward to off Portugal and the LOW centers penetrated south to 40°N latitude. By the end of the week the HIGH had built northward and blocked eastward movement of a LOW that turned northward.

At the beginning of the second week there was a large LOW near Moscow. Two LOWs combined to form a large LOW south of Kap Farvel. By the end of the week the Azores High and high pressure over Europe allowed a much weakened LOW into the Norwegian Sea. Another strong LOW moved northeastward from Newfoundland and raced into the Norwegian Sea the first of the third week.

There was a large HIGH over the Great Lakes and the Azores High was strengthening. The middle of the third week there was high pressure along the 45° to 50°N latitude belt. Tropical cyclone Fabian was born. Gloria was analyzed off the coast of Africa. A strong cyclone formed northeast of Fabian and penetrated the high pressure.

The fourth week found another LOW moving eastward from Labrador. Tropical storm Henri formed east of Charleston, SC. The Azores High was weak and south at 30°N, another HIGH came off Nova Scotia. At the end of the week Gloria was over New England. There was a LOW west of Cape Finisterre that moved northward and combined with extratropical Gloria.

A frontal wave formed near 38°N, 48°W on the 3d on a front that was off the East Coast on the 1st. There was high pressure to the north and east of the LOW that developed. On the 5th the LOW was moving northward as the northern HIGH moved northeastward. At 1200 the LOW was 998 mb near 48°N, 40°W. CHARLIE measured 45-kn winds from the east and 21-ft seas. The BRITISH STEEL (53°N, 43°W) had 42-kn north winds and 21-ft seas. The RAPID (52°N, 37°W) reported 40-kn winds from 240° and 20-ft waves. The SVENDBORG (59°N, 43°W) estimated 52-kn north winds and 26-ft seas. The winds were reported, at least received, as 60 kn from the northeast with 39-ft seas on the 7th. Another LOW formed west of this one and a frontal wave moved into the circulation from the southwest.

Figure 36.-- The area of greatest instability and highest winds are under the comma shaped cloud on the right of the image. NOAA Image.

By the 8th this LOW was gone but another had formed in the same area. At 1200 this LOW was 978 mb near 55°N, 35°W (fig. 36). The report from the SVENDBORG (59°N, 41°W) now read 68-kn from the northeast with 46-ft seas. The report from the FIRMNES (54°N, 42°W) was 72-kn from 300° with only 13-ft seas, and 20-ft swells. The FEDERAL OTTAWA (59°N, 21°W) measured 54-kn winds from the

east, 10-ft seas, and 26-ft swells.

On the 9th the OVERSEAS ARGONAUT (48°N, 36°W) found 42-kn winds and 25-ft seas. A fast moving LOW from Newfoundland would absorb this circulation by the 10th and would rapidly weaken.

This storm formed over northeastern Quebec and moved southeastward. Late on the 8th a Canadian ship at 48°N, 61°W reported 40-kn winds. On the 9th this LOW was moving into the southwest circulation of the storm described above. At 1200 on the 10th this was the primary storm. At 1200 on the 11th the storm was 974 mb near 60°N, 28°W. CHARLIE had 35-kn winds with 23-ft waves. The W.C. VAN HORNE reported 44-kn southwest winds, 17-ft seas, and 25-ft swells near 60°N, 18°W on the 12th. LIMA measured 36-kn westwinds and 21-ft waves. The storm continued to latitude 80°N.

On the 10th a series of frontal waves were traveling along an east-west front across the central U.S. East Coast. One of these was unstable and continued developing. The storm moved along the coast and at 1200 on the 12th was near 52°N, 52°W at 984 mb. The ANSGARITOR (52°N, 40°W) reported 56-kn southwest winds, 17-ft seas, and 26-ft swells. On the 13th CHARLIE measured 48-kn winds and 25-ft seas while LIMA measured 40-kn with 20-ft seas. The ANSGARITOR now had 48-kn winds and the DART AMERICA (52°N, 34°W) had 44-kn winds with 23-ft swells. The UFSP and UFSR, both near 56°N, 26°W, reported 60-kn west winds and 28-ft seas.

At 1200 on the 14th the storm was 972 mb near the Faeroe Islands. The BRIDGEWATER (54°N, 19°W) found 50-kn west winds, 17-ft seas and 36-ft swells. LIMA measured 43-kn west winds, 20-ft seas, and 28-ft swells. On the 15th the storm was over the Norwegian Sea moving toward Nordkapp.

On the 17th there was a large high pressure area centered between 45° and 50°N across the North Atlantic. An old front stretched from Ireland southwestward toward the inverted trough containing tropical storm Fabian. On the 18th a frontal wave was analyzed on the front northeast of Fabian. The LOW tracked northeastward through a weakness in the HIGH. At 1200 on the 19th the storm was 990 mb near 44°N, 40°W. The STEFAN DRESCHER (42°N, 45°W) had 48-kn north winds. The NEDLLOYD ROSARIO (42°N, 43°W) had 20-ft seas and 25-ft swells. On the 20th the AMERICAN CONDOR (45°N, 29°W) had 46-kn west winds and 35-ft swells. The VICTORIA PEAK (53°N, 29°W) had northwest 47-kn winds and 20-ft waves. On the 21st her winds were 50 kn, 17-ft seas, and 20-ft swells. The ERNST KRENKEL (46°N, 24°W) had 23-ft waves. The storm began weakening on the 22d.

A fast developing storm. It was a weak frontal wave on the 20th over James Bay and at 1200 on the 21st was a large sized closed LOW near Goose Bay. There were several strong gale reports on the 22d. The HELGAFELL (54°N, 52°W) had 44-kn at 0600 and 52-kn at 1800. On the 23d the VCWB (50°N, 51°W) measured 50-kn winds and 26-ft seas. The FALCON (51°N, 47°W) had 44-kn winds, 13-ft seas, and 30-ft swells.

At 1200 on the 24th the storm was 986 mb near 53°N, 35°W. There were a lot of gale reports and waves of about 15 ft. On the 25th the DART AMERICA (51°N, 41°W) had 44-kn northwest winds and 23-ft seas. The storm weakened quickly on the 26th.

Extratropical Gloria. Gloria was extratropical on the 28th as she moved into Canada. At 0000 on the 29th the storm was 994 mb over Belle Isle. The JUNGE GARDE (51°N, 50°W) had 50-kn winds. The VCWB (50°N, 51°W) measured 60-kn winds from 290° and 28-ft seas. On the 30th the winds were 55-kn and seas 30 ft. The storm was 972 mb at 53°N, 40°W. The platforms on the Grand Banks were registering winds of 50-kn and above. A ship at 45°N, 36°W reported 43-ft seas.

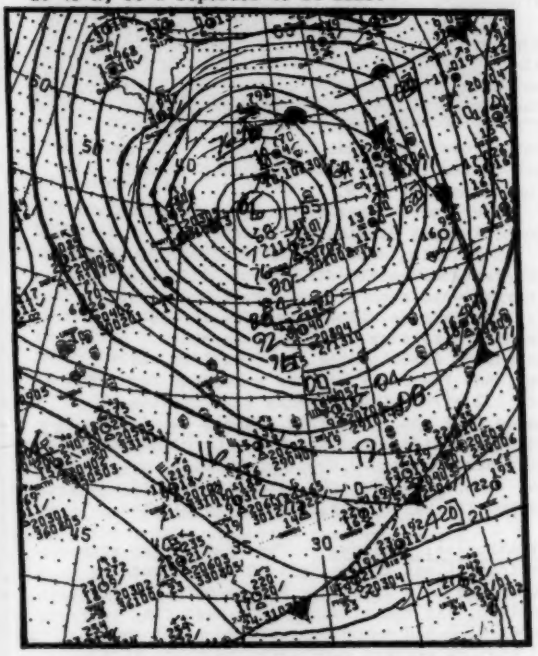


Figure 37.-- Analysis 1200, 01 October. The two 50-kn reports were not plotted directly on the chart, but were plotted on the edge.

On October 1 the storm was 966 mb at 55°N, 33°W (fig. 37). There were many gale reports and two of over 50 kn at 46°N and 25°W and 36°W. The highest waves were 26 ft south of the center. On October 2 the pressure was down to 960 mb. More like a winter storm rather than early fall. Again there were many gale-force winds. The CANADIAN EXPLORER (51°N, 38°W) reported 60-kn winds from the northwest, 15-ft seas, and 46-ft swells. Many others had swells over 30 ft. The storm was still 960 mb on the 3d. The STEFAN DRESCHER (45°N, 28°W) reported the highest wind of

60-kn from the northwest and 30-ft swells. ROMEO reported 33-ft seas. On the 4th the GEESTBAY (48°N, 18°W) sent two observations of 35-kn winds and 28-ft swells. Platforms and ships on the North Sea were reporting gales. A ship at 46°N, 20°W reported 20-ft seas and 33-ft swells. On the 5th this storm was weakening and racing northward as another approached.

Casualties -- The BONNY and FEDERAL ST LAURENT collided in poor visibility in River Scheldt. BONNY caught fire and 22 crewmembers abandoned ship. The Turkish warship MELTEM and Russian training vessel KHASAN collided in fog on the Sea of Marmara. The MELTEM broke in two and five crewmen died.

Hurricane-force winds struck Germany and Denmark on the 6th. The STENA GRECIA and FANAKI 1 collided. Ferry traffic to islands in the North Sea and Baltic Sea were halted. The ESTONIA went aground.

The ALSA sought shelter off Stampalia Island on the 11th in bad weather and touched bottom. The MERCURY had weather damage the 27th between Bermuda and Wilmington. The P.F.C. EUGENE A. OBREGON reported heavy weather damage at Rota, Spain the 25th. The SOLTA arrived Montreal with a container hanging over her side because of storm in the Atlantic.

Other Casualties -- The SOUTH PACIFIC had weather damage leaving the Rio Grande harbor on the 30th.

North Pacific Weather Log

July, August and September 1985

WEATHER LOG, JULY 1985 -- Most of the cyclones were concentrated west of longitude 180°. There was no particularly favored path. In general they came out of Asia or the Sea of Japan and tracked eastward until over the Kuroshia Current and then turned northward into the western Bering Sea. Three cyclones formed south of latitude 30°N and tracked northward. The cyclones over the eastern half of the ocean tracked northeastward to northward into the Gulf of Alaska. Two cyclones made counterclockwise loops in the vicinity of the Alaska Peninsula.

The only significant feature on the monthly mean sea-level pressure chart was the Pacific High (fig. 38). It was 1025 mb which was normal but was near 35°N, 164°W, about 700 mi southwest of its normal position. There were two weak Lows along the northern latitudes, a 1008 mb near 50°N, 157°E, and a 1014 mb near 53°N, 168°W.

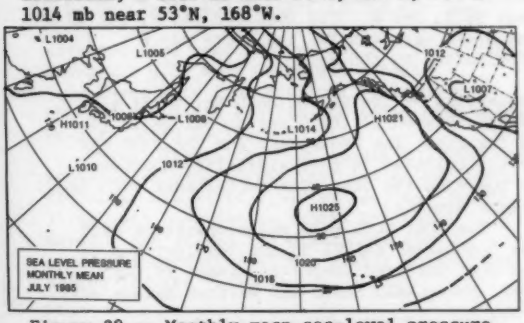


Figure 38.-- Monthly mean sea-level pressure.

The sea-level pressure departure from normal chart was weak. The largest anomaly was plus 4 mb near Mys Navarin on the coast of Siberia. There were three minus 3 mb centers stretched across the 40° to 50°N latitude band.

The monthly mean 700 mb chart differed more from climatology than the surface mean chart. Normally the mean Low center of circulation is over the North Pole. This month there were several Low centers inside the Arctic Circle. Plus there were two anomalous Low centers approximating latitude 55°N, one over the tip of Kamchatka and the other near Unalaska Island. A trough paralleled the Kurile Islands and east of Honshu. The normal trough along the U.S. West Coast was along latitude 140°W rather than 125°W. The ridge over the coastal mountains was accentuated across southern Alaska and across the Bering Strait.

There were seven tropical cyclones over the eastern ocean; Fefa, Guillermo, Hilda, Ignacio, Jimean, Keven, and Linda. Jeff was the only tropical cyclone over the western ocean.

Some Climatology -- On July 30, 1965 Portland Oregon equalled their all time record high temperature of 107°F.

Extratropical Cyclones -- The first of the month the extratropical version of typhoon Irma moved along the Kurile Islands into the Bering Sea. The Pacific High was well west of its normal position with a LOW off Oregon. The LOW moved northward into the Gulf of Alaska. The HIGH remained stationary and another small LOW formed off Oregon.

The weather pattern remained static into the second week with another high pressure cell over the southeastern Bering Sea. Weak LOWs and frontal waves were over the western ocean. By midweek the HIGHs had weakened and the eastern half of the ocean had a flat gradient. At the end of the week another HIGH had built over the central ocean with another HIGH centered near the Washinton coast.

A bubble of the Pacific High moved over the south coast of Alaska at the beginning of the third week as a LOW moved southeastward from the Bering Sea and made a cyclonic loop south of Unimak Island. By the end of the week (21st) the Pacific High was near normal. Another HIGH was east of Hokkaido and a large cyclonic circulation, for July, was over the central ocean.

The above weather situation remained static into the fourth week with this LOW making a cyclonic loop over Unimak Island.

Typhoon Jeff was southeast of Tokyo. At midweek the ocean was dominated by high pressure except for three tropical cyclones and remained so until the end of the week. The end of the month a small significant LOW formed over midocean.

The first storm of the month was the extratropical continuation of Typhoon Irma. At 0600, July 1 she was considered extratropical. At 0400 the PRESIDENT EISENHOWER (38°N, 145°E) measured 50-kn southwest winds, 23-ft seas and 20-ft swells. At 0600 a Japanese ship near 38°N, 146°E measured 58-kn winds and 25-ft seas and swells. The PRESIDENT HOOVER (38°N, 144°E) measured 52-kn winds from the west and 23-ft seas. At 1200 the storm was at 44°N, 146°E at 976 mb. On the 2d, the SOUTHERN PROGRESS (42°N, 154°E) had 42-kn winds and 26-ft seas (fig. 39). The RYBAK CHUKOTKI also had 23-ft seas and 26-ft swells. There were a few gales on the 3d but they were gone on the 4th. As the storm approached 60°N late on the 5th it turned west and then southward.

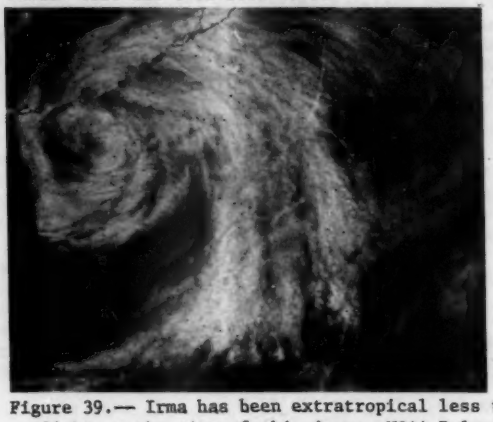


Figure 39.— Irma has been extratropical less than 24 hr at the time of this image. NOAA Polar

From the 23d to the 26th there were some strong winds off the California coast because of a strong gradient from the Pacific High and the heat LOW over the California Valleys.

At 1800 on the 23d the NARRAGANSETT (40°N, 124°W) had 35-kn winds from 330°. At 0000 on the 24th the DRZG (39°N, 125°W) found 36-kn winds also from 330° and 15-ft waves. At 1800 there were five reports of 37- and 38-kn winds between 33° and 42°N and between 125° and 129°W. The call letters of the ships were DJEE, JGLU, NSVR, WMCK, and SHIP. At 0000 on the 25th the TOYOTA MARU No. 16 still had 39-kn north winds near 33°N, 127°W. At 1800 the WGBR had 42-kn. The CHEVRON MISSISSIPPI (42°N, 127°W) had 35-kn winds on the 26th. Later in the day the pressure gradient relaxed as the HIGH center moved northward.

This frontal wave formed south of a HIGH that was centered south of Adak Island on the 27th. At 0000 on the 29th the storm was 988 mb near 43°N, 179°W. Three ships reported gales. The ASIAN HIGHWAY and JINEI MARU both reported 40-kn easterly winds near 46°N, 179°W. The highest waves were 20 ft. A ship southeast of the center had 38-kn south winds. At 1200 the PFRS (48°N, 175°W) reported 40-kn east winds and 18-ft seas.

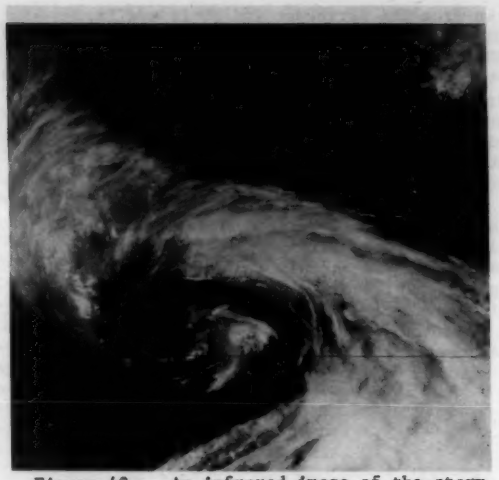


Figure 40.— An infrared image of the storm.

At 0000 on the 30th the storm was still 988 mb near 48°N, 171°W but had increased in size, nearly doubling (fig. 40). There were still gales up to 40-kn in the northwest quadrant. At 0600 the NEW YELLOW SEA found 46-kn winds. On the 31st the HIRA MARU (47°N, 151°W) had 37-kn south winds. The VERMILION HIGHWAY (47°N, 159°W) found 43-kn southwest winds and 15-ft waves that continued into August 1. On August 2 the storm was 994 mb near 54°N, 146°W. The DONG SUH (48°N, 146°W) had 37-kn west winds. The storm was dissipating on the 3d.

Casualties — The SHINDO MARU No. 5 hit a bridge caisson of the O Naruto Bridge in fog on the 7th. The KYOWA MARU and the AMERICAN APOLLO collided in poor visibility southwest of Tokyo on the 5th. The former sank with one seaman missing.

The FORT GOOD HOPE while operating with the icebreaker KALVIK in the Beaufort Sea on the 17th suffered propeller damage in the ice. The HOWARD SMITH had weather damage July 9-10.

Other Casualties — The HYUNDAI CON SIX and HYUNDAI CON SEVEN both were at Australia because of heavy weather. The AETOLIA lost port anchor and 2.5 shackles of chain outside Port Muhammad Bin Qasim on the 9th. The GENERAL VALDEZ suffered damage off Sydney in rough seas. The HAI MA 747 collided with a ferry at Levuka in poor visibility on the 31st. The TOYOTA No. 23 contacted the SHANTA SHIBANI in strong winds at Aden on July 6.

WEATHER LOG, AUGUST 1985 — There were fewer than normal cyclone tracks this month and even fewer qualified as storms. There was a weak primary path from the La Perous Strait eastward to about 49°N, 170°E and then curving northeastward toward Bristol Bay. Four cyclones criss-crossed over the Gulf of Alaska. Cyclones were scattered northward from the Sea of Okhotsk to the Arctic Ocean. Four moved northward into the Arctic Ocean.

The monthly mean sea-level pressure chart was near normal in appearance but the pressure was generally above normal over the Pacific north of approximately 30°N (fig. 41). The Pacific High was 1029 mb near 42°N, 153°W. This was 5 mb higher than normal and about 200 mi northwest of the normal location. There was a 1009 mb Low at 63°N, 170°E. There was an anomalous 1007 mb Low near Great Salt Lake.

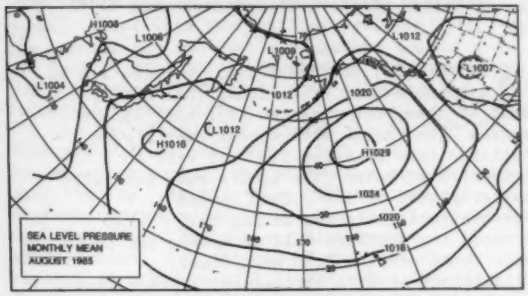


Figure 41.— Monthly mean sea-level pressure.

The largest anomaly center was plus 7 mb near 48°N, 153°W, a plus 4 mb center near Anchorage and another near 36°N, 147°E. The Low over Utah produced a minus 5 mb center.

In the upper air at 700 mb the heights were above normal over the primary shipping lanes. Below normal heights were over the U.S. Northwest and the Philippine and South China Seas. The major trough was shifted eastward from near 180° to 165°E. The trough along the U.S. West Coast was normal.

There were four tropical cyclones over the Eastern North Pacific and seven over the Western North Pacific.

Some Climatology - On August 26, 1883 the Krakatoa Volcano in the East Indies exploded. The blast was heard 2,500 mi away and 36,000 lives were lost due to debris and tidal waves. Ash filled the atmosphere and the average temperature of the planet dropped one degree for two years.

Extratropical Cyclones — The month started with a flat Pacific High and LOWs along the 45°-60°N latitude belt. Tropical storm Kit formed, Kevin and Linda were over the eastern ocean. At the end of the week the Pacific High was strengthening and bulging northward. This pushed the LOWs over the Bering Sea.

The start of the second week the Pacific High was 1036 mb. A second HIGH center developed near 35°N, 160°E putting the vast majority of the ocean under high pressure. Tropical cyclone Lee developed and Mary was over the eastern waters. At the end of the week the Pacific High was 1042 mb near 50°N, 145°W. The western HIGH broke down and a LOW moved southeastward over the Kurile Islands.

The third week the LOW was turned northward by the persistent Pacific High. Mamie and Nelson were over the western ocean. The Pacific High was decreasing in intensity and drifting southward. At the end of the week the Pacific High was again up to 1034 mb near 40°N, 145°W. An extension was 1030 mb near 50°N, 175°E.

As the fourth week started the Pacific High stretched westward and the western cell moved eastward. By the 23d the pressure pattern had broken up into multiple weak cells. Odessa formed in the west and Olaf in the east. At the end of the week the Pacific High had consolidated the ocean north of 15° and west to 150°E. The end of the month there were three tropical cyclones in a tight group south of Japan; Odessa, Pat, and Ruby (fig. 42).

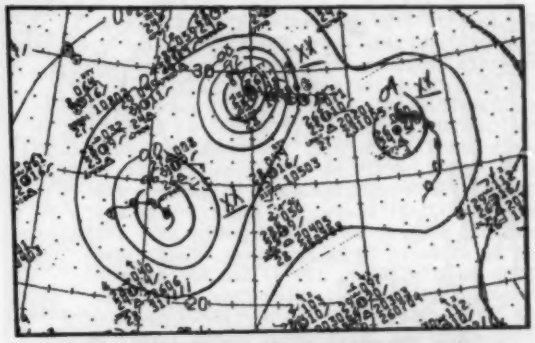


Figure 42.—Odessa, Pat, and Ruby as they were analyzed and as a satellite composite indicated on 29 August.

Tropical storm Jeff moved over the Yellow Sea on August 1 and was extratropical by the 2d. The LOW moved over the Sea of Japan on the 3d. The center was 996 mb on the 5th near 52°N, 170°E. The PRESIDENT GRANT (48°N, 172°E) had 38-kn southwest winds with only 12-ft waves. On the 6th this LOW was moving through the southern circulation of another LOW centered over the northern Bering Sea

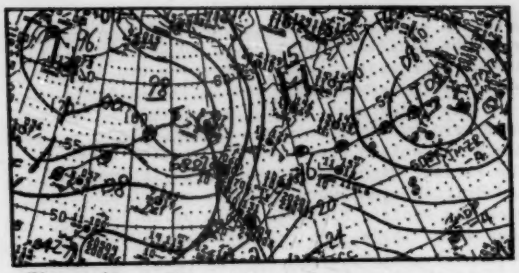


Figure 43.— Three LOWs stretch across the northern latitudes. The center one is the one of interest.

(fig. 43). On the 7th two ships had gales near 52°N, 161°W. The storm was 986 mb near Cape Romanzof on the 8th. A ship near 53°N, 135°W had 39-kn west winds and 20-ft seas. The GIOVANNI (54°N, 172°W) reported 40-kn winds. The storm was curving westward, then southward and eastward to die out on the 10th.

The Pacific High was building and drifting eastward starting about the 8th. As the pressure gradient tightened the winds along the West Coast increased. The CHEVRON MISSISSIPPI (44°N, 129°W) had 35-kn winds. The CHEVRON LOUISIANA (42°N, 125°W) had 38-kn north winds on the 9th. On the 10th a SHIP at 41°N, 125°W had 35-kn winds. On the 11th the EXXON HOUSTON measured 40-kn winds from the north and 21-ft seas. The Pacific High was now 1042 mb near 48°N, 145°W. The NWXD (48°N, 125°W) measured 50-kn northwest winds. The EXXON HOUSTON (47°N, 129°W) had 40-kn north winds and 21-ft seas. The winds were 36 on the 12th. The MINORU (48°N, 128°W) found 38-kn winds and 21-ft waves on the 13th. On the 14th a SHIP (48°N, 125°W) reported 45-kn winds. Probably the same SHIP had 38-kn on the 15th. Several ships near 52°N, 133°W had 35-kn winds on the 16th. The gradient was now relaxing and the winds dropped below gale force.

This LOW developed over Manchuria on the 17th and crossed the Kurile Islands on the 18th. The storm was 992 mb on the 19th and some gales were being reported. The PRESIDENT EISENHOWER (41°N, 154°E) had 35-kn winds and 19-ft waves. On the 20th the UNI MODEST (45°N, 161°E) measured 42-kn northeast winds, 15-ft seas, and 20-ft swells. The TOYOTA MARU No. 10 at 43°N, 156°E also measured 42-kn winds but from the north, 13-ft seas, and 23-ft swells.

On the 21st the storm was 1005 mb near 40°N, 162°E and nearly stationary. A Japanese ship east of the storm reported 39-kn winds. A westward extension of the Pacific High was blocking any movement. The LOW dissipated on the 23d.

Casualties — There were three collisions in fog this month. The REGENT TAMPOPO and MING UNIVERSE collided near 40°N, 154°W, near midocean on the 4th. The KINRIKI MARU No. 3 and MIKURASAN MARU collided off Japan on the 13th. The KOTOBUKI MARU and KEIWA MARU also collided near the Japan coast.

The BEAUFORT SEA EXPLORER reported ice damage to barges in the Beaufort Sea and the MISCAROO reported damaged propeller blades.

The MARATHA MARINER reported heavy weather damage at Sasebo. The NAWABSHAH ran aground and sank in bad weather in the Strait of Malacca. The ORINOCO was surveyed in Japan for weather damage on the 13th. The fishing trawler PELICAN R burned and sank in rough seas 225 mi off Oregon.

Other Casualties — On August 3 the icebreaker VLADIVOSTOK piloted the MIKHAIL SOMOV out of the Antartic ice field where it had been trapped for 4 months. The KARA-GEORGE and SKULPTOR ZALKALNS had heavy weather damage near Australia. The MEGHNA shipped heavy seas in the Andarnan Sea. The PAB developed a leak in heavy weather off Amini Island on the 19th and sank near 11°N, 73°E.

WEATHER LOG, SEPTEMBER 1985 — There was an average number of cyclones this month, most of them occurring the last half of the month. The tracks were spread over a wide latitude band of about 1,000 mi with no concentrated path. The tracks were generally easterly west of 180°, then turned northeasterly into the Bering Sea. Three crossed the northern Gulf of Alaska and there were three off the U.S. West Coast. Climatology shows a northeasterly track from Honshu to the Gulf of Alaska.

The monthly mean sea-level pressure pattern was dominated by a 1028 mb Pacific High, 7 mb higher and 600 mi farther north than normal. (fig. 44). The Aleutian Low was 1008 mb, 2 mb higher and about 500 mi northwest of the normal. The Pacific High was at 44°N, 148°W and the Aleutian Low at 62°N, 172°W. An anomalous trough stretched southwestward. The pressure pattern over the western half of the ocean was rather flat.

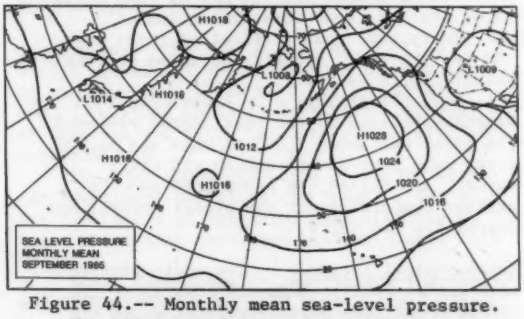


Figure 44.-- Monthly mean sea-level pressure.

The major pressure anomaly was plus 12 mb near 50°N, 150°W. Positive values were north of latitude 30°N and east of longitude 175°W. There was a minus 9 mb center near 80°N, 150°W and there were several storms over this area of the Arctic Ocean. The trough from the Aleutian Low produced a negative mean pressure area approximately bounded by longitude 160°E and 175°W from the Bering Strait to latitude 25°N.

The primary center of cyclonic circulation at 700 mb was at 80°N, 160°W. A sharp trough stretched southwestward. An upper air version of the Pacific High was higher than normal and farther north producing a broad ridge over the Gulf of Alaska, Alaska, and off the North American coast.

There were four eastern tropical cyclones, Rick, Sandra, Terry, and Vivian. There were five western tropical cyclones, Tesa, Val, Winona, Andy, and Brenda.

Some Climatology -- On September 25, 1939 a hurricane moved onshore south of Los Angeles bringing heavy rains. Nearly 5 1/2 inches fell at Los Angeles in 24 hr. It caused much damage along the coast and claimed 45 lives at sea.

Extratropical Cyclones -- The month started out with a large Pacific High centered near 45°N, 150°W and a large HIGH over the western ocean. There were two tropical cyclones over the western and two over the eastern ocean. The Pacific High persisted through the week but the western HIGH broke down allowing the formation of weak LOWs.

As the second week started the Pacific High was 1034 mb near 50°N, 150°W. Skip became extratropical and produced a couple gale reports. At midweek a HIGH was moving eastward across midocean and the Pacific High was weakening. Pauline and Rick became extratropical. At the end of the week the Pacific High had rebuilt, there was a LOW off Vancouver Island and a large LOW moving into the Bering Sea.

The third week (15th) the ocean basin was mostly under high pressure but a frontal wave formed east of Honshu and was a severe storm on the 18th. The storm weakened by the end of the week.

The fourth week high pressure was tracking eastward southwest of the above storm and another potential storm was moving out of Manchuria. The second severe storm moved north of the Aleutians and at the end of the week turned northward. The Pacific High had bulged northward and was centered near 60°N, 125°W. At the end of the month a LOW was speeding eastward along 40°N and turned northeastward at about 180°. It became the primary center of a large cyclonic circulation that dominated the ocean north of 35°N except for a HIGH off British Columbia.

This first significant LOW was analyzed as a frontal wave east of Tokyo on the 0000 chart of the 16th. There were several ship reports that helped identify its formation. The PRESIDENT LINCOLN (35°N, 150°E) had 38-kn southeast winds. The EUROPEAN HIGHWAY (35°N, 144°E) had 45-kn south winds, 13-ft seas, and 33-ft swells according to their report. On the 17th the PRESIDENT WASHINGTON (38°N, 160°E) measured 43-kn southeast winds, 33-ft seas, and 21ft swells. At 1900 the HOEGH DENE (44°N, 165°E) had 49-kn north winds, 18-ft seas, and 39-ft swells.

At 0000 on the 18th the storm was 979 mb near 43°N, 165°E. The TOWER BRIDGE (44°N, 161°E) measured 46-kn north winds, 23-ft seas, and 26-ft swells. The HOEGH DENE (44°N, 166°E) at 0400 reported 47-kn east winds, 18-ft seas, and 36-ft swells. At 0300 the SANTA AMELIA MARU nearby (44°N, 166°E) measured 46-kn east winds, 17-ft seas, and 30-ft swells. On the 19th (fig. 45) the PRESIDENT TRUMAN (41°N, 170°E) estimated 50-kn southwest winds, 17-ft seas, and 41-ft swells. At 0600 the swell was down to 33 ft. Three ships in the vicinity of 38°N, 170°E reported gales and waves of 23 ft. There were no gale reports on the 20th. The PRESIDENT GRANT (54°N, 180°) had 37-kn winds from the northeast on the 21st. The KOHO MARU (51°N, 179°E) was sailing eastward with the storm and at 1800 had 44-kn north winds and 16-ft swells. The storm was weakening rapidly on the 22d. Another ship near 48°N, 165°W reported 20-ft swells. The LOW disappeared on the 24th.

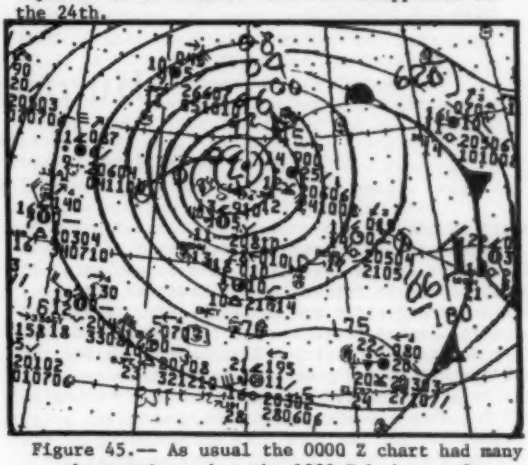


Figure 45.— As usual the 0000 Z chart had many observations, but the 1200 Z had very few.

A weak LOW formed over Mongolia and moved over Sakhalin Island on the 22d. As it moved over water it picked up energy and deepened. Ships on the Sea of Okhotsk reported gales on the 23d. Ostrov Urup measured 40 kn. At 0000 on the 24th the storm was 984 mb near 53°N, 162°E. The OSHU MARU (43°N, 160°E) had 54-kn northwest winds. At 1800 the NEPTUNE SEGINUS (46°N, 177°E) reported 44-kn winds, 33-ft seas, and 39-ft swells from the west and west-southwest. On the 25th she measured 33-ft seas and swells (fig. 46). The winds were mostly gales. The storm was 982 mb at 54°N, 175°E. The AMERICA SUN (46°N, 173°E) had 43-kn winds and 25-ft waves. This was a large almost circular storm about 1700 mi in diameter. At 0600 on the 26th the AMERICA SUN sent a STORM report of 45-kn winds, 10-ft seas, and 25-ft swells. The storm was weakening as it turned northward. The SHELDON LYKES (38°N, 177°W) had 40-kn winds and 21-ft waves. On the 28th the LOW turned westward and dissipated.

Casualties -- The CHIE MARU No. 11 had the cargo shift in large swell, flooded and sank

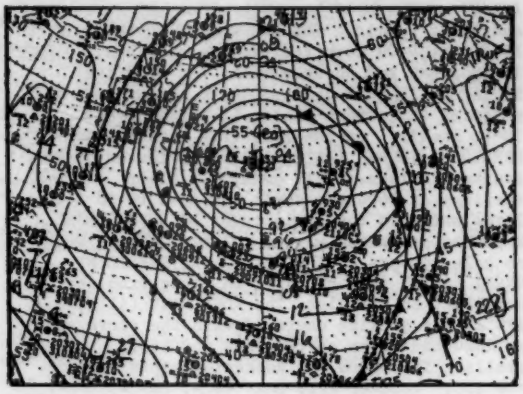


Figure 46.-- The storms are approaching winter size and intensity.

near 33°N, 129°E on the 22d. The CONTI HELVETIA sustained engine damage from water in heavy weather. The KNIEPSAND was surveyed at Busan for weather damage. The LANKA AJITHA was also surveyed at Busan for weather damage that occurred on the 28th.

An Arctic storm damaged an artificial island in the Beaufort Sea 80 mi northwest of Tuktoyaktuk. An oil rig toppled over in 60 mi/hr winds and 13-ft waves on the 17th. The crew of 87 men were evacuated by ship and helicopter. The waves eroded the island which was made from dredged material. The storm was centered near 77°N, 136°W at the time.

Other Casualties — The ADDIRIYAH reported weather damage at Dubai that occurred September 26-27 but not where.

The LAKE BARRINE had weather damage at New Plymouth on the 7th. The UNION ROTORUA had weather damage 2d to 3d from Taurango to Sydney.

Hurricane Alley

Dick DeAngelis
National Oceanographic Data Center
Washington, DC

HURRICANE HAVENS

The Naval Environmental Prediction Research Facility has published a companion volume to their Typhoon Havens Handbook for the Western Pacific and Indian Oceans. Based upon the demand for this type of information they now have a Hurricane Havens Handbook for the North Alantic Ocean. Basically these guides offer a ready-reference decision-making aid for ship's captains and others who are responsible for the safety of ships facing a hurricane or typhoon threat. They provide guidance on assessing the threat and choosing appropriate countermeasures for specific ports. They also provide general guidance for ports not covered. In addition these guides contained detailed climatologies, which include information on how winds, waves and tides affect the port. They are among the most practical weather studies ever published. In the past we have carried condensed versions for specific ports -- next issue we will summarize Port Everglades. We have also received a number of inquiries as to how to purchase these important volumes.

These publications can be purchased from NTIS using the following order form (fig. 47):

The following information will assist you in ordering:

Title	NTIS No.	Price
Hurricane Havens Handbook for the North Atlantic Ocean	ADA 116 101	$22.95 domestic $45.90 foreign
Hurricane Havens Handbook Change No. 1	ADA 130 264	$16.95 domestic $33.90 foreign
Hurricane Havens Handbook Change No. 2	ADA 144 437	$16.95 domestic $33.90 foreign
Typhoon Havens for the Western Pacific and Indian Oceans	ADA 092 373	$11.95 domestic $23.90 foreign

Microfiche is available for each of these four items at a cost of $5.95 domestic, $11.90 foreign for each. Changes No. 1 and No. 2 are additional port studies. Rush orders can be placed by calling 800-336-4700 (in Virginia 703-487-4700). Foreign prices usually apply in countries other than the United States, Canada and Mexico. NTIS is represented in many countries by local cooperating organizations and publications can be ordered through these groups. They are too numerous to list but if you need a specific location let us know.

TROPICAL CYCLONE SUMMARIES

The tropical cyclone tracks (fig. 48) and the summaries are based upon information provided by Ted Tsui of the Naval Environmental Prediction Research Facility, Clarence Lee and his staff at the Central Pacific Hurricane Center, Emil Gunther and his staff at the Eastern Pacific Hurricane Center and Neil Frank and his staff at the National Hurricane Center. Additional information was supplied by the Joint Typhoon Warning Center at Guam. Table 7 lists the tropical cyclones that have developed so far in 1986.

TROPICAL CYCLONES--JULY 1985

Global activity was slightly above normal as eleven tropical cyclones including five hurricanes came to life. This compares with eight and six last year and the long term average of nine tropical cyclones of which

four or five reach hurricane intensity.

Early in the month activity was sporadic as Fefa and Guillermo developed south of Acapulco where surface water tempertures were in the low 80's (°F). Their northwestward tracks took them over cooler waters before they could develop beyond tropical storm strength. From the 16th through the 21st six tropical cyclones came to life, including two in the Atlantic, while the North Pacific spawned four — three in the east and one in the west. This activity was widespread, from south of Bermuda to the Mariana Islands. Three of the storms developed on the 21st while Jimena was discovered just one day earlier. These four all reached hurricane intensity and except for Bob, who made landfall rather quickly, they all lasted for more than one week. Surface water temperatures were about 80° to 85°F in the areas of hurricane intensity for all storms. The end of the month saw a brief flurry of activity as Kevin, Linda and Kit developed over the North Pacific on the last three days. Only the western storm, kit, reached typhoon strength and that wasn't until near the end of the first week in August.

Several July storms created problems at sea and along coastal areas. During Ana, a 60-yr old, 43-ft schooner the WILLIAM M. DRAKEL was flooded in rough seas off Bermuda. Two Canadians and an American were rescued from a rubber raft after abandoning the vessel. During hurricane Bob the VASILIOS G. grounded off Charleston, S.C., where 3-to 5-ft storm tides flooded historic areas. In the western North Pacific Jeff battered Shanghai and coastal Zhejiang Province leaving 180 people dead and tens of thousands homeless. The 500-ton SETTSU MARU NO. 2 was driven aground near Okinawa. Along the China coast some 1,400 vessels, mainly fishing boats, were sunk or damaged.

TROPICAL CYCLONES--AUGUST 1985

Global activity was above normal as 15 tropical cyclones, similar to last year, developed. However this year 12 of these reached hurricane intensity compared to five last year and an average of seven. Water temperatures in the active areas ranged from about 82° to 86°F.

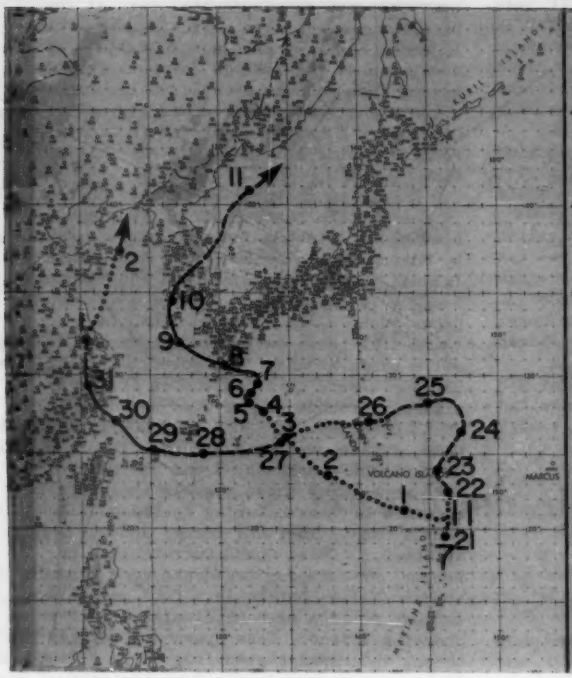
While action was slow to start, there were three carryover storms from the previous month. By the 10th three tropical cyclones had come to life one each in the western and eastern North Pacific and one in the Atlantic. Descriptions of the Atlantic storms can be found on page 6 in this issue. From the 12th through the 17th two tropical cyclones roamed the Atlantic while the western Pacific had two going from the 16th through the 20th. Eastern Pacific activity picked up again as Nora and Olaf developed within a few days of each other. Most of the eastern North Pacific storms, including these two made it across 20°N before reaching 125°W. However late in the month Pauline maintained a west-northwesterly course that took her into central North Pacific waters. At the same time Skip had developed just east of the Dateline and was also affecting these waters. In fact, eight of this months fifteen storms developed in the last 10 days with action spread from Cuba to mainland China. Seven of these eight reached hurricane intensity. Continuing a month-long trend the western Pacific storms all formed in the Philippine Sea.

Damage to shipping was mainly concentrated in the western North Pacific. Pat and Ruby combined to clobber Japan. They were assisted by Odessa in the south. From the Ryukyu Islands to Hokkaido more than 150 fishing boats were capsized or damaged while many other vessels ran aground. Onshore, torrential rains caused mudslides and flooding while winds knocked down powerlines. At least 23 people were dead and scores of others missing. Groundings included the HAND KWONG, FERRY OSUMI NO. 5, SHOYO MARU NO. 1, ARISHIMA MARU, BULACAN and HAKUYO MARU. The SAND MARU NO.3, TATSUKO MARU NO. 8 and the NAKAYOSHI MARU were among those vessels that either capsized or sank. During hurricane Elena the MASTER GEORGE lost her rudder and was assisted by the U.S. Coast Guard Cutter LIPAN to Tampa. No shipping incidents were reported in typhoon Nelson but he left four people dead and one million without electricity after crossing Taiwan. Tess spawned a tornado on Luzon, which was responsible for one death and 56 houses destroyed. In Hong Kong the container vessel NEW HORSE collided with the FIONA MARY. Tess also caused havoc in Guangdong Province, China where her torrential rains created mudslides and flooding which left one person dead. Typhoon Mamie also hit mainland China near Yantai. Her torrential rains and strong winds caused 16 deaths and the worst damage in more than one quarter of a century; particularly hard hit were parts of the Jiaodong Peninsula.

Ship reports were plentiful during the month. Several vessels reported on tropical storm Lee, including the AQUARIUS and MAIN EXPRESS. Both encountered 20-ft swells and 40-kn winds. During typhoon Nelson several vessels rode 23-to 25-ft swells in 40-to 50-kn winds. On the 23d the MARGARET LYKES reported 50-kn winds, 21-ft seas and 25-ft swells. In the Gulf of Mexico on the 31st the BOHEME ran into hurricane Elena. Some 200 mi south of the storm she reported 53-kn winds in 23-ft seas.

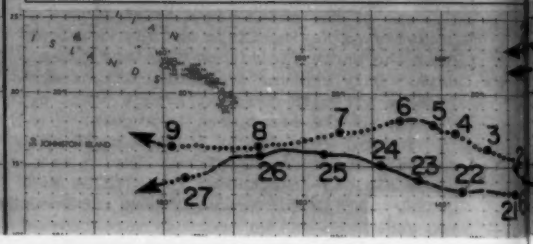
TROPICAL CYCLONES--SEPTEMBER 1985

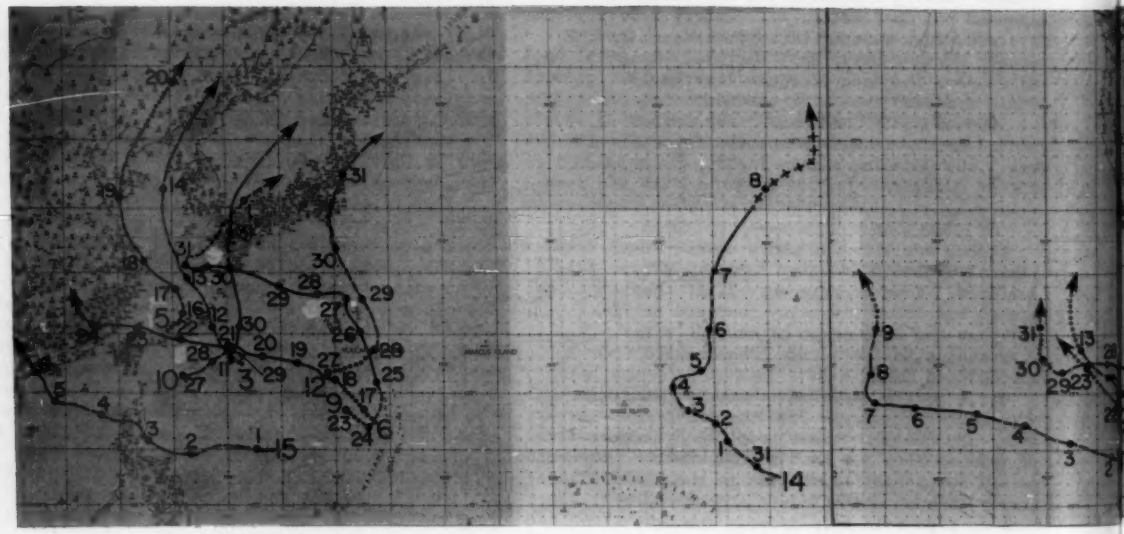
Global activity was near normal as twelve tropical cyclones developed with six of them reaching hurricane intensity. The normal is twelve and seven, while last season fifteen came to life and seven became hurricanes. As September opened, five tropical cyclones were already roaming the waters from the Gulf of Mexico to the Sea of Japan. The eastern North Pacific quickly spawned two more. Both became hurricanes and Rick made it into central North Pacific waters. These storms formed in an area where surface water temperatures were running about 80° to 84°F as did all the

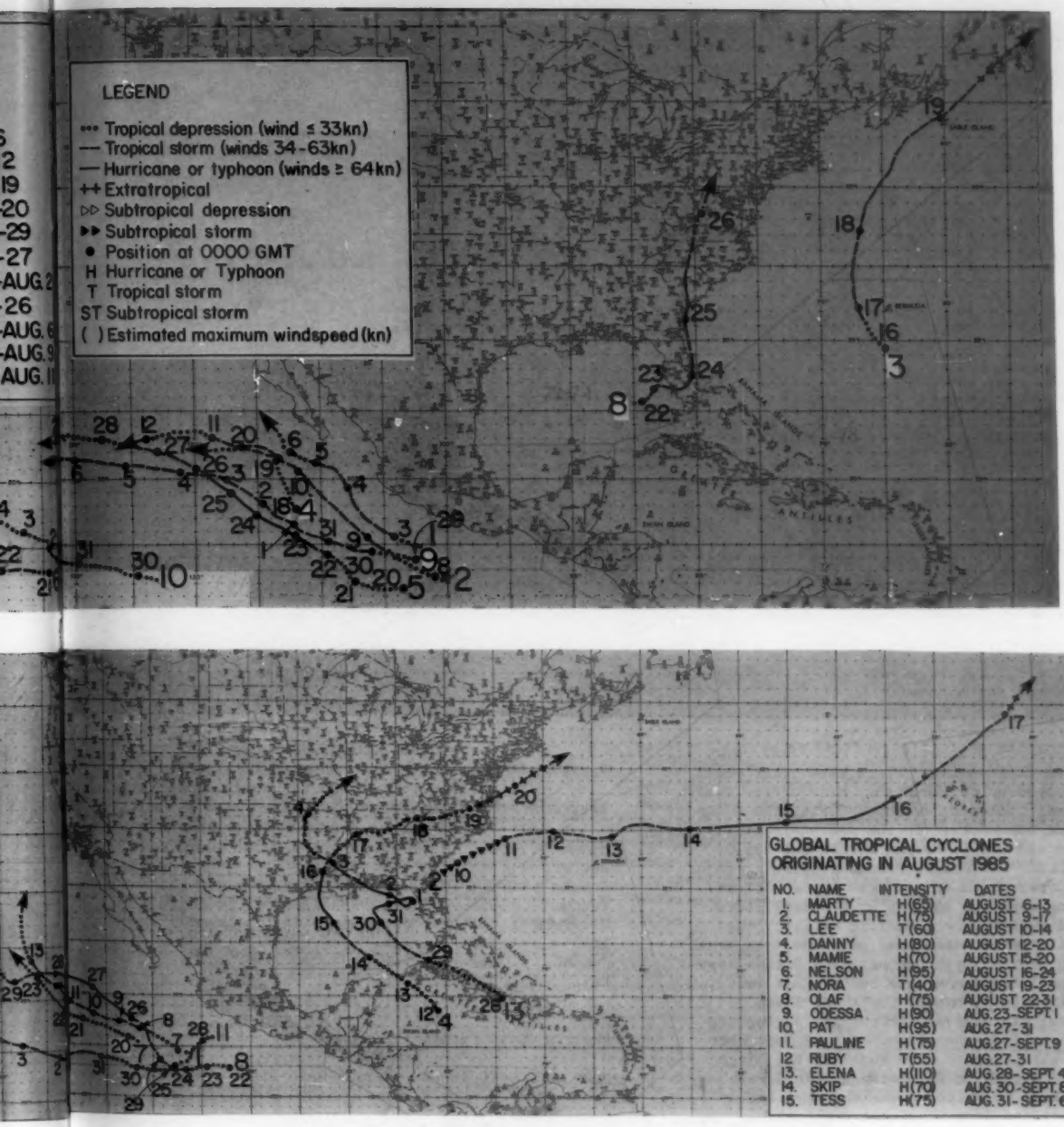


GLOBAL TROPICAL CYCLONES ORIGINATING IN JULY 1985

NO.	NAME	INTENSITY	DATES
1.	FEFA	T(60)	JULY 2-6
2.	GUILLERMO	T(50)	JULY 7-12
3.	ANA	T(60)	JULY 16-19
4.	HILDA	T(35)	JULY 18-20
5.	JIMENA	H(115)	JULY 20-29
6.	IGNACIO	H(115)	JULY 21-27
7.	JEFF	H(75)	JULY 21-AUG. 2
8.	BOB	H(65)	JULY 21-26
9.	KEVIN	T(55)	JULY 29-AUG. 6
10.	LINDA	T(44)	JULY 29-AUG. 9
11.	KIT	H(85)	JULY 31-AUG. 11



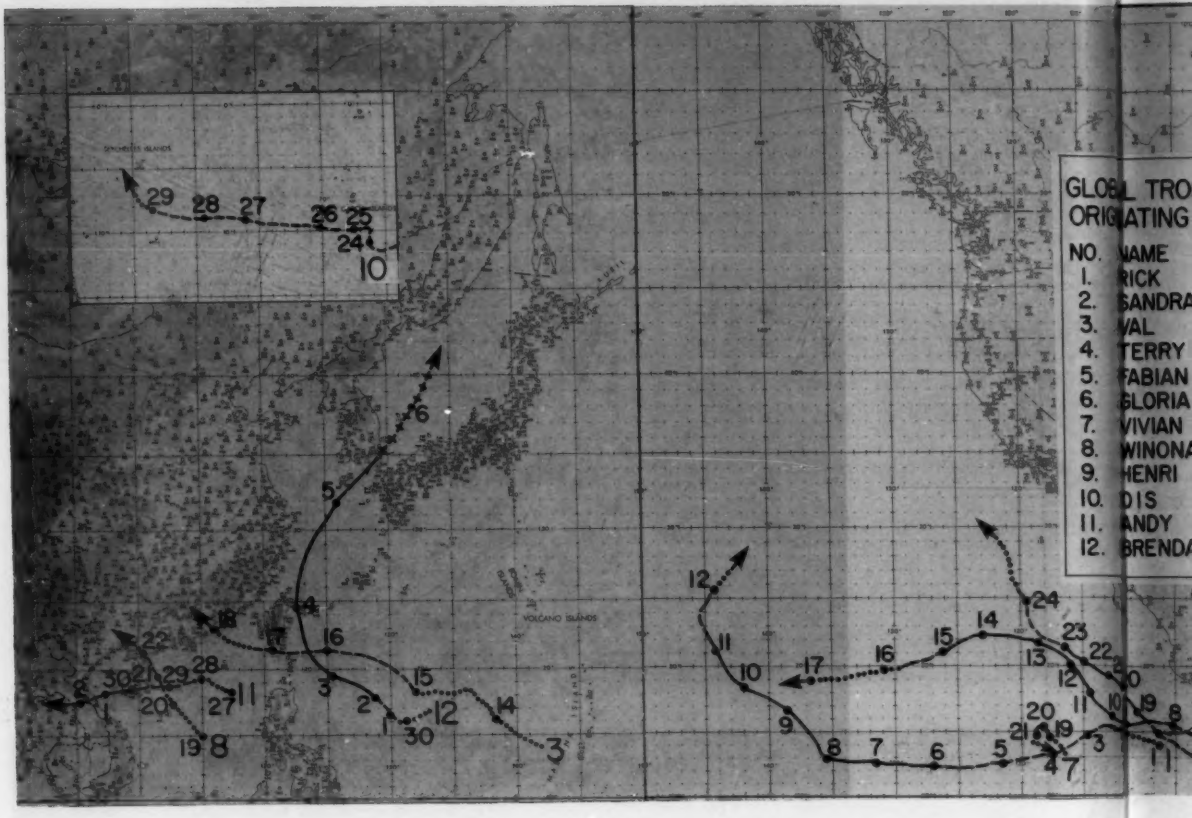



LEGEND
••• Tropical depression (wind ≤ 33kn)
— Tropical storm (winds 34-63kn)
— Hurricane or typhoon (winds ≥ 64kn)
++ Extratropical
▷▷ Subtropical depression
▶▶ Subtropical storm
• Position at 0000 GMT
H Hurricane or Typhoon
T Tropical storm
ST Subtropical storm
( ) Estimated maximum windspeed (kn)

GLOBAL TROPICAL CYCLONES ORIGINATING IN AUGUST 1985

NO.	NAME	INTENSITY	DATES
1.	MARTY	H(65)	AUGUST 6-13
2.	CLAUDETTE	H(75)	AUGUST 9-17
3.	LEE	T(60)	AUGUST 10-14
4.	DANNY	H(80)	AUGUST 12-20
5.	MAMIE	H(70)	AUGUST 15-20
6.	NELSON	H(95)	AUGUST 16-24
7.	NORA	T(40)	AUGUST 19-23
8.	OLAF	H(75)	AUGUST 22-31
9.	ODESSA	H(90)	AUG. 23-SEPT. 1
10.	PAT	H(95)	AUG. 27-31
11.	PAULINE	H(75)	AUG. 27-SEPT. 9
12.	RUBY	T(55)	AUG. 27-31
13.	ELENA	H(110)	AUG. 28-SEPT. 4
14.	SKIP	H(70)	AUG. 30-SEPT. 8
15.	TESS	H(75)	AUG. 31-SEPT. 6

Figure 48.-- Tracks of tropical cyclones for July, August, and September 1985.



systems this month. Things were quiet until Val popped up on the 13th. Nine of the twelve tropical cyclones developed during the second half of the month. In the North Atlantic Fabian and Gloria formed within one day of each other and Gloria became a classic, major East Coast storm of the Cape Verde variety. She was also the month's most potent storm. In the western North Pacific activity was slightly below normal and only the late month development of typhoons Andy and Brenda kept it from being a complete bust. Eastern Pacific waters, except for short-lived tropical storm Vivan, were quiet during the second half of the month. A rare September storm also came to life south of the Diego Garcia Islands in the South Indian Ocean.

Damage to shipping was sketchy, but observations from Gloria were plentiful. On the 27th the ADDIRIYAH encountered southerly 53-kn winds in 13-ft seas about 180 mi southeast of the center. Farther north the OMI DYNACHEM reported 60-kn winds in 21-ft seas and the NEPTUNE CONCORD had 58-kn winds in 23-ft swells. Later the same day the SEA LAND DEVELOPER off New Jersey measured 75-kn winds in nearly 25-ft swells. The TROPIC SUN and FORTALEZA also ran into rough conditions that same day.

Table 7.--Tropical Cyclone Watch, 1986

Australia - South Pacific

--	8S	T	Jan.
Hector	9S	T	Jan.
Pancho	10S	T	Jan.
Vernon	11P	T	Jan.
Winifred	12P	H	Jan.
Ima	15P	H	Feb.
June	16P	T	Feb.
Keli	17P	T	Feb.

Western North Pacific

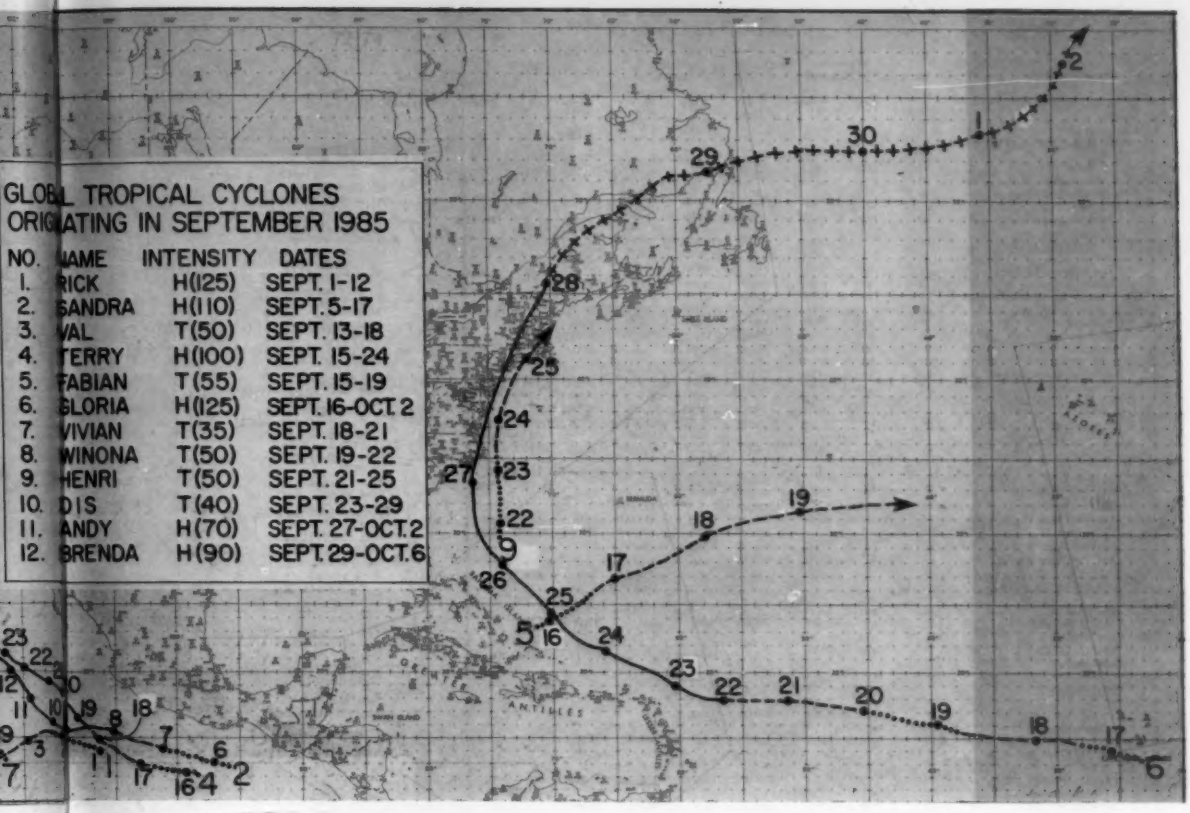
Judy	TD 1W	H	Feb.

South Indian Ocean

Delifinina	4S	H	Jan.
Costa	5S	H	Jan.
--	6S	T	Jan.
Ophelia	7S	H	Jan.
Erinesta	13S	H	Jan.
Filomena	14S	T	Feb.

North Indian Ocean

--	01B	T	Jan.


GLOBAL TROPICAL CYCLONES
ORIGINATING IN SEPTEMBER 1985
NO. NAME INTENSITY DATES
1. RICK H(125) SEPT. 1-12
2. SANDRA H(110) SEPT. 5-17
3. VAL T(50) SEPT. 13-18
4. TERRY H(100) SEPT. 15-24
5. FABIAN T(55) SEPT. 15-19
6. GLORIA H(125) SEPT. 16-OCT. 2
7. VIVIAN T(35) SEPT. 18-21
8. WINONA T(50) SEPT. 19-22
9. HENRI T(50) SEPT. 21-25
10. DIS T(40) SEPT. 23-29
11. ANDY H(70) SEPT. 27-OCT. 2
12. BRENDA H(90) SEPT. 29-OCT. 6

HURRICANE GLORIA

In addition to the excellent forecasts and warnings issued by the National Hurricane Center and the Hurricane Warning Offices along the east coast during Gloria, these offices also made an outstanding effort to collect data. Much of these non-routine data along with ship observations give a more complete picture of the hurricane. The following table is a result of this effort by National Weather Service Offices at Charleston (SC), Wilmington (NC), Cape Hatteras, Norfolk, Washington, Baltimore, Wilmington (DE), Atlantic City, Newark, New York City, Hartford, Bridgeport, Providence, Boston, Portland, and Concord. In addition the Buoy and some coastal station data (C-Man) was provided by Dave Gilhausen of the National Data Buoy Center. A summary of hurricane Gloria appears on page 9 of this issue.

BUOY DATA
HURRICANE GLORIA - SEPTEMBER 1985

Station	Location	Date	Corrected Pressure (millibars)		Wind (knots)			Maximum Wave		
			Low	Time+	8 min. avg.	Time+	Gusts	Time+	Height (ft.)	Time+
41001	34° 54'N, 72° 54'W	27	1000.0	0700	/37	0700	/50	0700		
41002	32° 18'N, 75° 18'W	26	974.9	2100	/51	27/0100	/71	27/0100	46.9	2000
41006	29° 18'N, 75° 18'W	26	995.2	1100	/29	1500	/41	1500	26.2	1300
44005	42° 42'N, 68° 18'W	27	1000.2	2300	/29	28/0000	/47	28/0000	21.3	28/0200
44007	43° 30'N, 70° 06'W	27	987.1	2300	/45	2200	/58	2200	19.7	28/0000
44008	40° 30'N, 69° 24'W	27	1002.3	1900	/35	1700	/43	1700		
44009	38° 30'N, 74° 24'W	27	965.0	1200	/49	1500	/64	1500		
44012	38° 48'N, 74° 24'W	27	966.0	1300	/43	1200	/56	1200		
						1600		1600		
44013	42° 24'N, 70° 48'W	27	986.6	2100	/47	2000	/62	2000		

+Time in GMT

TROPICAL CYCLONE DATA
HURRICANE GLORIA - SEPTEMBER 1985

Station	el. (ft.)	Date	Pressure (millibars) Low	Time+	Wind (knots) 1 min. avg.	Time+	Gusts	Time+	Highest Tide (feet) #	Time+	Storm Rainfall (inches)	Remarks
South Carolina												
Beaufort	32	26	1002.5	2035							trace	
Charleston	48	26	1003.7		310/20		310/22				trace	
Charleston (Custom House)	9	26			030/16		NE/25		1.2	27/0000		
Myrtle Beach (AFB)	25	27	1004.0	0055	/18	0100	/29	0100	0.6	26/2200	trace	
North Carolina												
Cape Hatteras (WSO)	4	27	947.5	0536	110/64	0302	100/76	0304	6-8	0600	2.10	Wind dir. & tide est.
Cape Lookout		27	979.1	0400	/56	0500	/71	0500				
Cherry Point (MCAS)	35	27	985.3	0353	320/31	0335	/52	0527	6		7.00	Tide est., U.S. Navy Boat Dock
Diamond Shoal Light		27	958.8	0500	130/84	0500	/99	0500				Wind equip. failed 0700
Frying Pan Shoal		27	990.3	0000	/54	26/2200	/62	26/2200				
Jacksonville	27	27	990.3	0456	300/27	0256	/43	0231			3.36	
New Bern	18	27	987.8	0400							7.09	
Raleigh-Durham(WSFO)	444	27	999.5	0650	320/15	0623					0.03	
Wilmington(WSO)	28	27	995.3	0252	340/23				4	26/2300	1.46	Tide est. Wrightsville Beach
Virginia												
Chesapeake Light		27	970.9	0900	/72	1000	/79	1000				Max. wave height 20.3 ft. at 1000
Dulles Int. Airport	290	27	997.3		300/21		270/30				1.89	
Milford Haven CG	10	27	986.1	0800	320/60	0800	320/70	0900				Wind equip. unofficial
National Airport(DC)	10	27	995.6		300/21		W/35				3.96	
Norfolk(WSO)	24	27	981.4	0830	300/40	0950	315/58	1033	4.0	1000	5.65	
Norfolk(NAS)	32	27			300/38	0950	300/79	0950	4.1	0900		Tide at Sewells Pt.
Richmond(WSO)	164	27	993.6	0945	360/24	0950	360/31	0957			4.02	
Wallops Island(NASA)	40	27	977.0	1150	WNW/61						4.36	
Maryland												
Aberdeen	57	27	991.2	1600			340/40	1700				
Baltimore(WSO)	148	27	993.6	1307	315/29	1652	NW/39	1205			6.04	
Cove Point C.G.	3	27	998.7	1530			W/25	1530				
Martin Airport	61	27	992.2	1145			NW/65	1145				
Salisbury	60	27					NW/57	1314				
Delaware												
Dover (Del. St. College)		27	984.1	1300	340/27	1448					6.48	rainfall at Camden
Dover (AFB)	24	27	982.8	1255			300/60	1410				
Indian River Inlet C.G.		27					315/68	1420	3.5			
Lewes (College of Marine Studies)		27			290/41	1600	270/60	1600				
Wilmington(WSO)	74	27	986.1	1301	320/33	1434	NW/56	1516			3.75	
New Jersey												
Atlantic City(WSO)	64	27	969.9	1352	300/42	1633	NW/60	1632	5.7	1320	1.83	
Atlantic City (Marina)	12	27			W/35	1600	NW/59	1634			1.78	
Lakehurst(NAS)	110	27	971.0				NW/60	1818			3.74	
McGuire(AFB)	148	27					NW/62	1820			4.13	
Millville	71	27					NW47	1449			4.71	
Newark	7	27	974.9	1615	NW/38	1850	W/58	1801			3.35	
Ocean City		27	948.2	1400	WNW/70	1500	W/87	1700	7.9MLW		2.00	possible funnel cloud
Port Republic		27	983.1				NW56					
New York												
Central Park (New York City)	132	27	972.9	1605	270/20		/45	1810	7.0	1706	3.58	tide at Battery Park
Islip (MacArthur Airport)	84	27	968.5	1535			/73	1608				
JFK Int. Airport	13	27	967.5		280/40		/50				2.64	
La Guardia Airport	11	27	969.9		300/40		/56	1745	4.3	1636	2.92	tide at Willets Pt.
Westhampton	67	27					/45					
Connecticut												
Bridgeport	250	27	965.1	1720	180/64		/80				0.62	
East Hartford		27	972.2	1830			/58					
Fairfield		27	960.4	1702							1.65	coop pressure
Hartford(WSO)	169	27	971.6	1810	170/37	1850	S/57				1.17	
Meriden	100	27	988.5	1730	/52	1730						3-hrly data
New Haven C.G.	9	27	980.7	1800	130/43	1800						
Norfolk (Coop)	1340	27	977.3	1800	/30		/43				4.45	
Waterbury-Oxford	727	27					/83	1600				eye; 1730-1800
Weston (Skywarn Spotter)		27	965.1								4.70	
Windsor Locks	201	27	964.8	1810	/37	1750	/57	1748				
Rhode Island												
Block Island	109	27			/46		/66	1830				
Castle Hill C.G.	10	27					/78	1800				
Newport	155	27					/70	1800				
Providence(WSO)	51	27	986.1	1910	180/45	1850	S/72	1849	1-2			
Smithfield	428	27					/70	1900				
Westerly	81	27					/78	1830				

+ Time is GMT
# Tide is above normal unless indicated

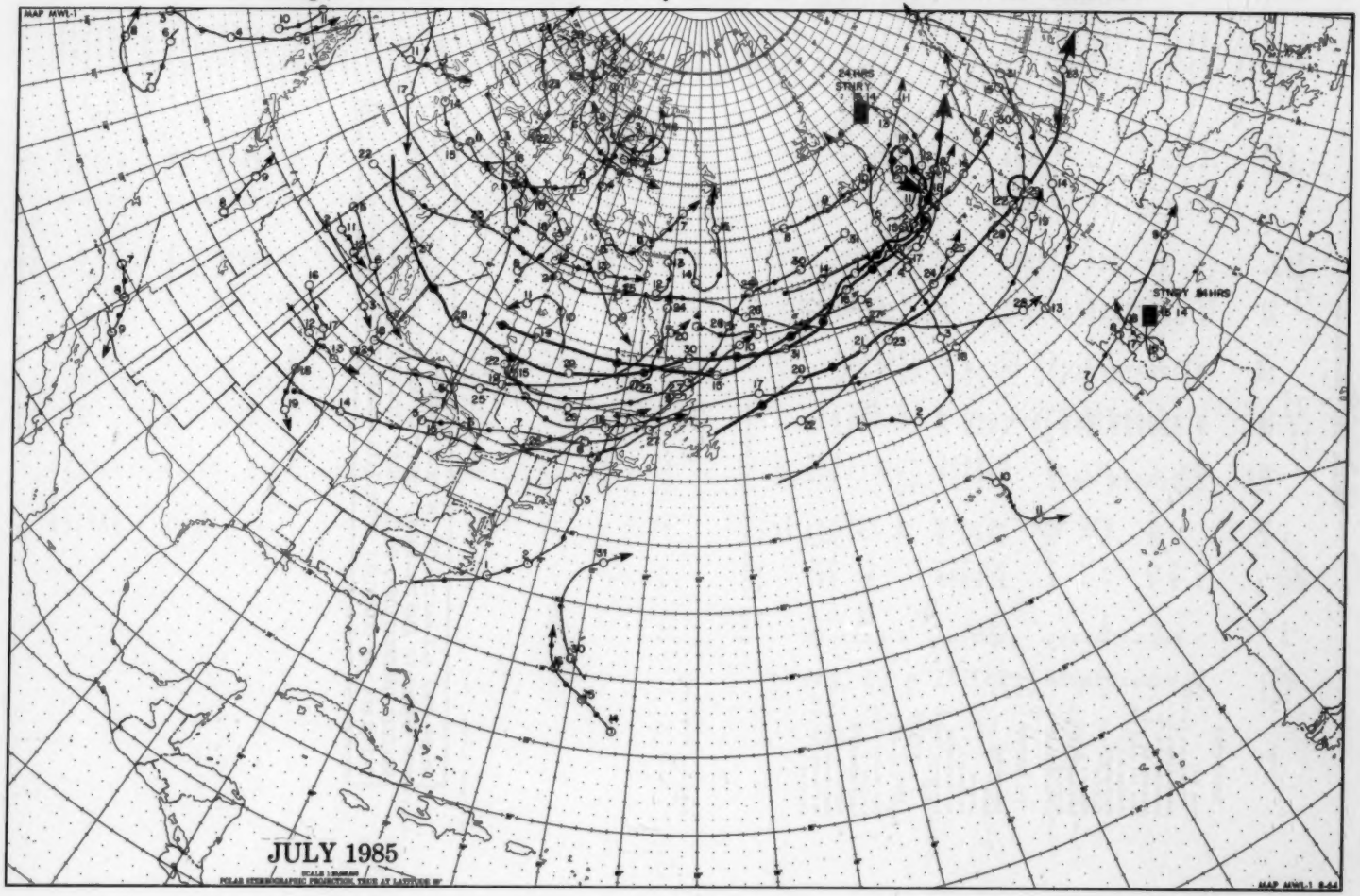
TROPICAL CYCLONE DATA
HURRICANE GLORIA - SEPTEMBER 1985

Station	el. (ft.)	Date	Pressure (millibars) Low	Time+	Wind (knots) 1 min. avg.	Time+	Gusts	Time+	Highest Tide (feet) #	Time+	Storm Rainfall (inches)	Remarks
Massachusetts												
Blue Hill Observatory (Milton)	629	27	983.1		SSE/67	1852	SSE/87	1852		-	0.40	
Boston (Logan Int.)	15	27	984.8		S/53	2008	S/66	2008			0.38	
Brant Pt. C.G.	10	27			/45	1900	/55	1900				
Buzzards Bay L.S.	65	27	992.6	1900	/57	1800	/65	1800				
Cape Cod Canal C.G.	60	27			/40	2000	/52	2000				
Chatham C.G.	88	27			/58	2030	/95	2030				
Chatham(WSO)	31	27			/63	1833	/70	1833				
Falmouth	132	27					/83	2100				
Menemsha C.G.	28	27			/45	2000	/70	2000				
Merrimac River C.G.	10	27			/35	1730	/60	1730				
Scituate	120	27			/70	1930	/87	1930				
Worcester(WSO)	986	27	981.0	2000	140/31		SE/62	1842			1.66	
New Hampshire												
Concord(WSO)	343	27	981.0	2056	090/18	2056	/38	2050				
Keene	481	27	983.7	1845	110/25	1845	/42	1845				
Lebanon	568	27	983.4	2050	320/10	2150	/20	2150				
Manchester	233	27	981.0	2055	180/30	2055	/50	2055				
Mt. Washington	6280	27	990.2		SE/110							
Portsmouth (Pease AFB)	127	27	986.1	2108	140/40	2038	/65	2038				
Maine												
Cape Neddick C.G.		27					/50	2300				
Caribou	624	27	990.9								0.81	
Goal Island C.G.		27					/50	2200				
Manana Is. C.G.		27					/55	2300				
Mantinicus Rock C.G.		27	994.8	2300	180/48	2200	/56	28/0000				
Mt. Desert Rock C.G.	10	27	998.3	2300	160/43	2300	/50	2300				
Portland	43	27	987.0	2208	SE/46	2148			1.0	28/0400	0.41	

+ Time is GMT
# Tide is above normal unless indicated

WE OF NOAA ARE MAKING USE OF THIS SMALL AMOUNT OF SPACE TO EXTEND OUR THANKS TO ALL THE SHIPS' OFFICERS WHO ROUTINELY TAKE SHIPBOARD WEATHER OBSERVATIONS. TO US, THESE EXCELLENT OBSERVATIONS ARE PRICELESS. WE CERTAINLY APPRECIATE RECEIVING THEM REGULARLY.

Principal Tracks of Centers of Cyclones at Sea Level, North Atlantic



Closed circle indicates 0000 and open circle 1200 GMT positions. Square indicates stationary center. Cyclone tracks marked with heavy line are described in the Weather Log.

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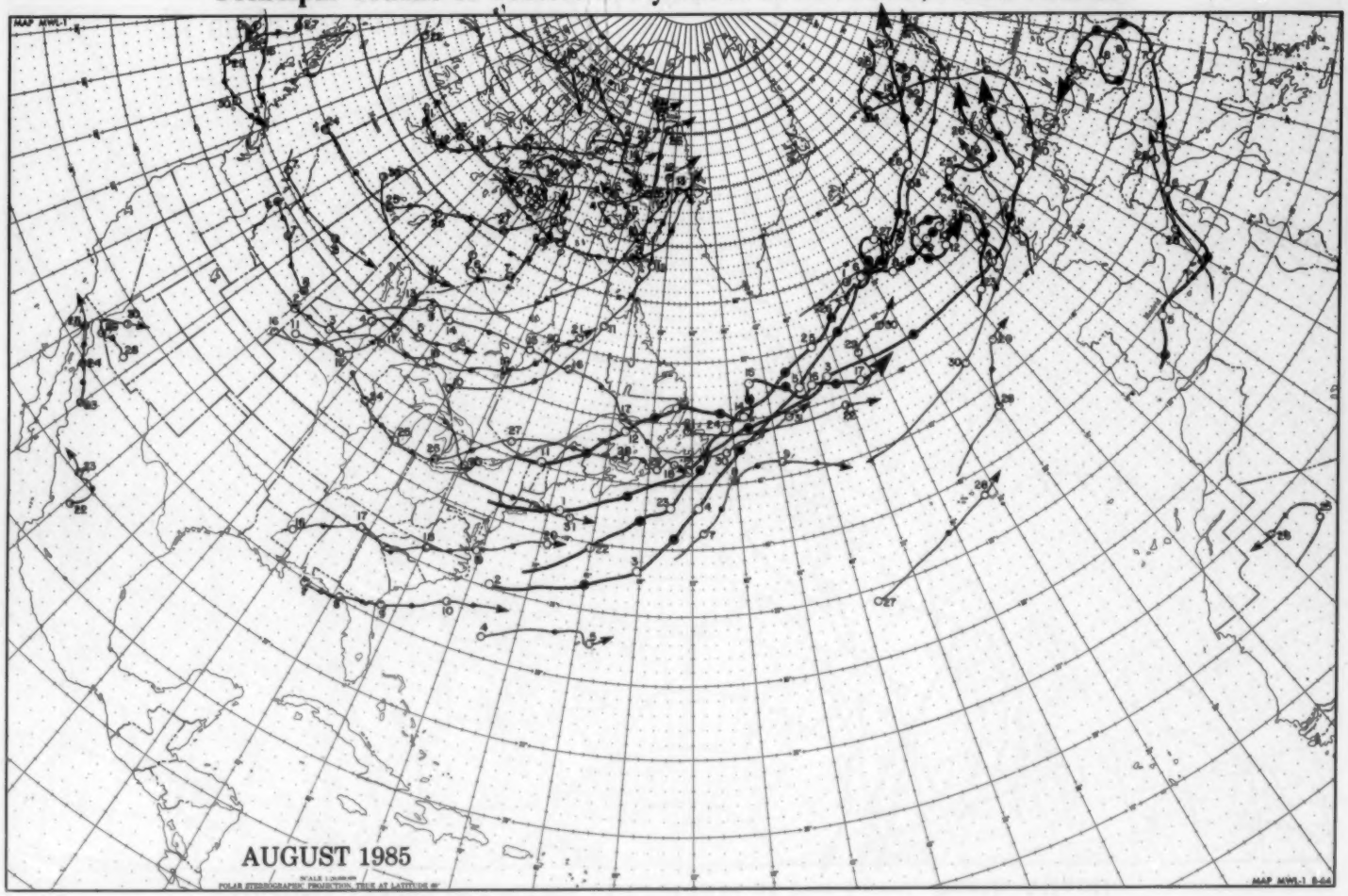
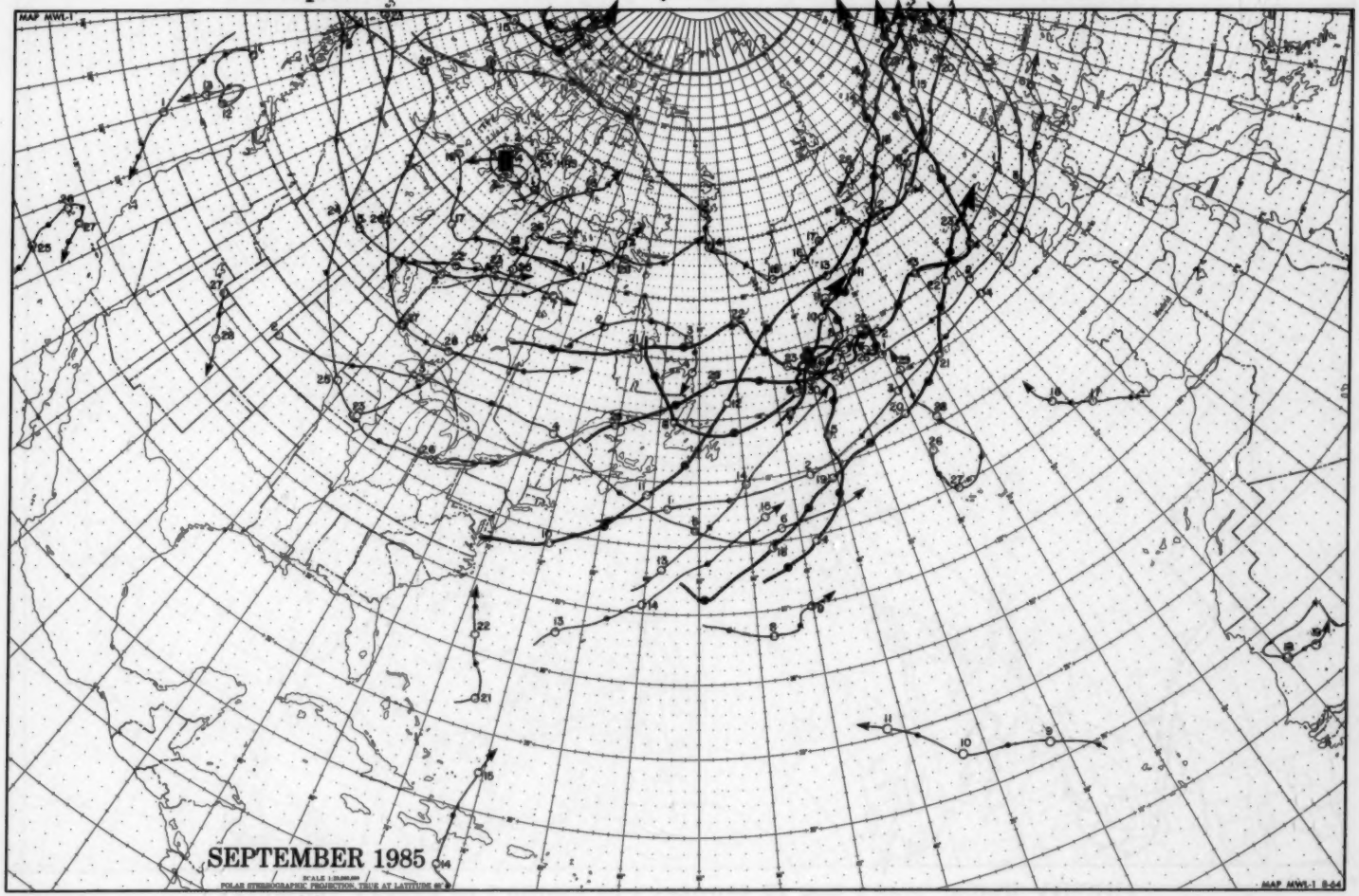
Principal Tracks of Centers of Cyclones at Sea Level, North Atlantic



Closed circle indicates 0000 and open circle 1200 GMT positions. Square indicates stationary center. Cyclone tracks marked with heavy line are described in the Weather Log.

Principal Tracks of Centers of Cyclones at Sea Level, North Atlantic



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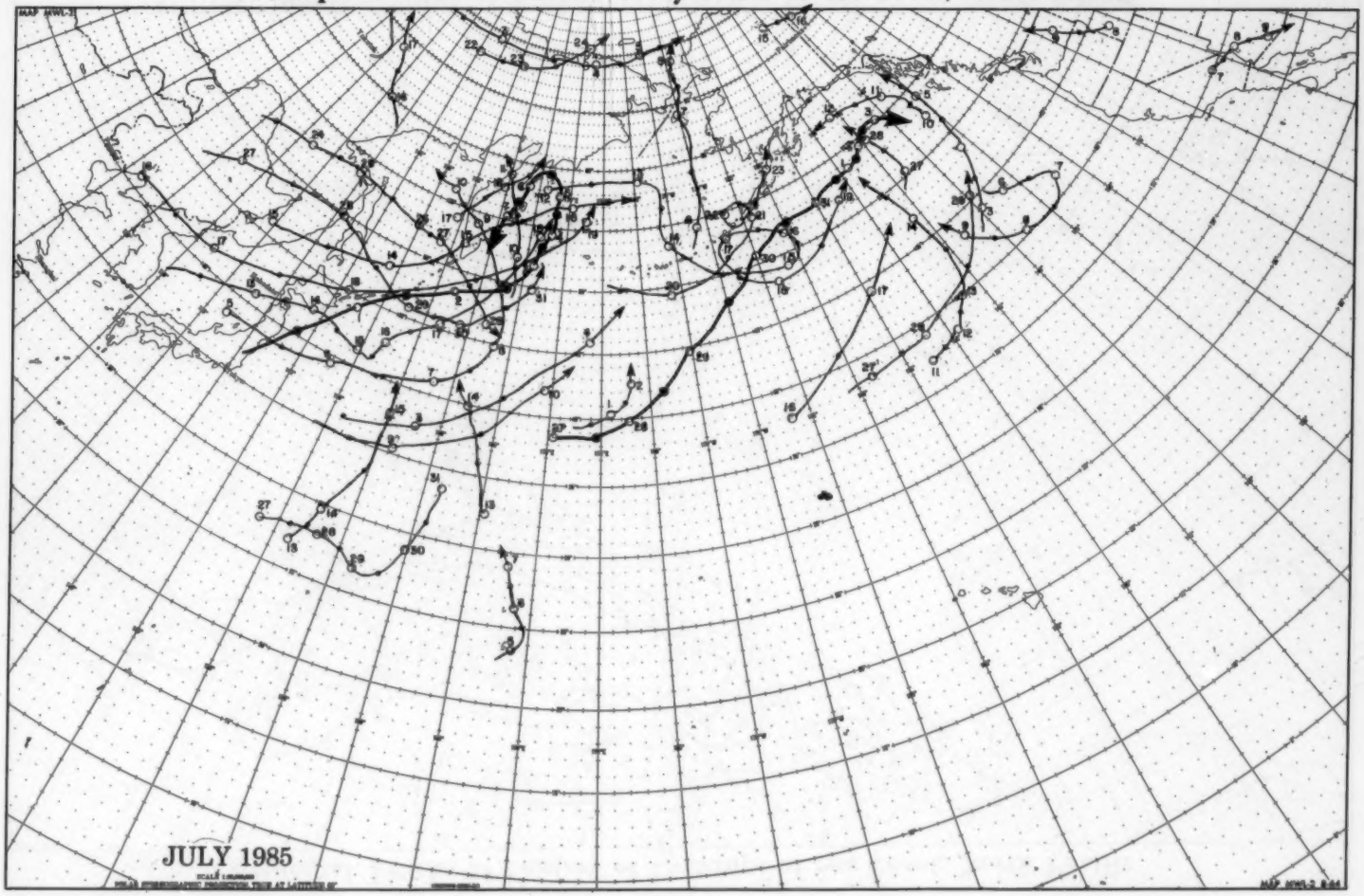
Closed circle indicates 0000 and open circle 1200 GMT positions. Square indicates stationary center. Cyclone tracks marked with heavy line are described in the Weather Log.

Principal Tracks of Centers of Cyclones at Sea Level, North Pacific



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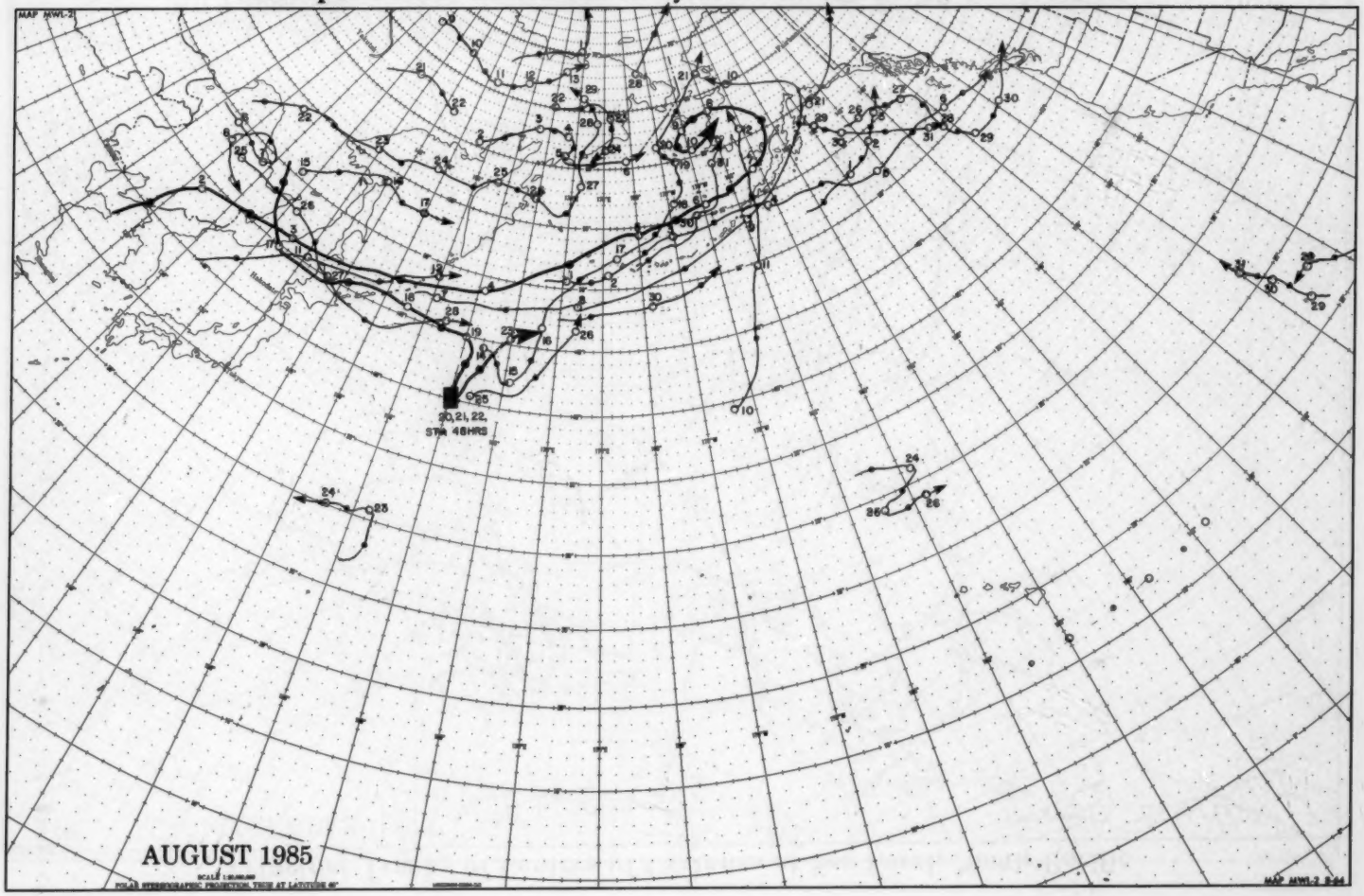
Principal Tracks of Centers of Cyclones at Sea Level, North Pacific



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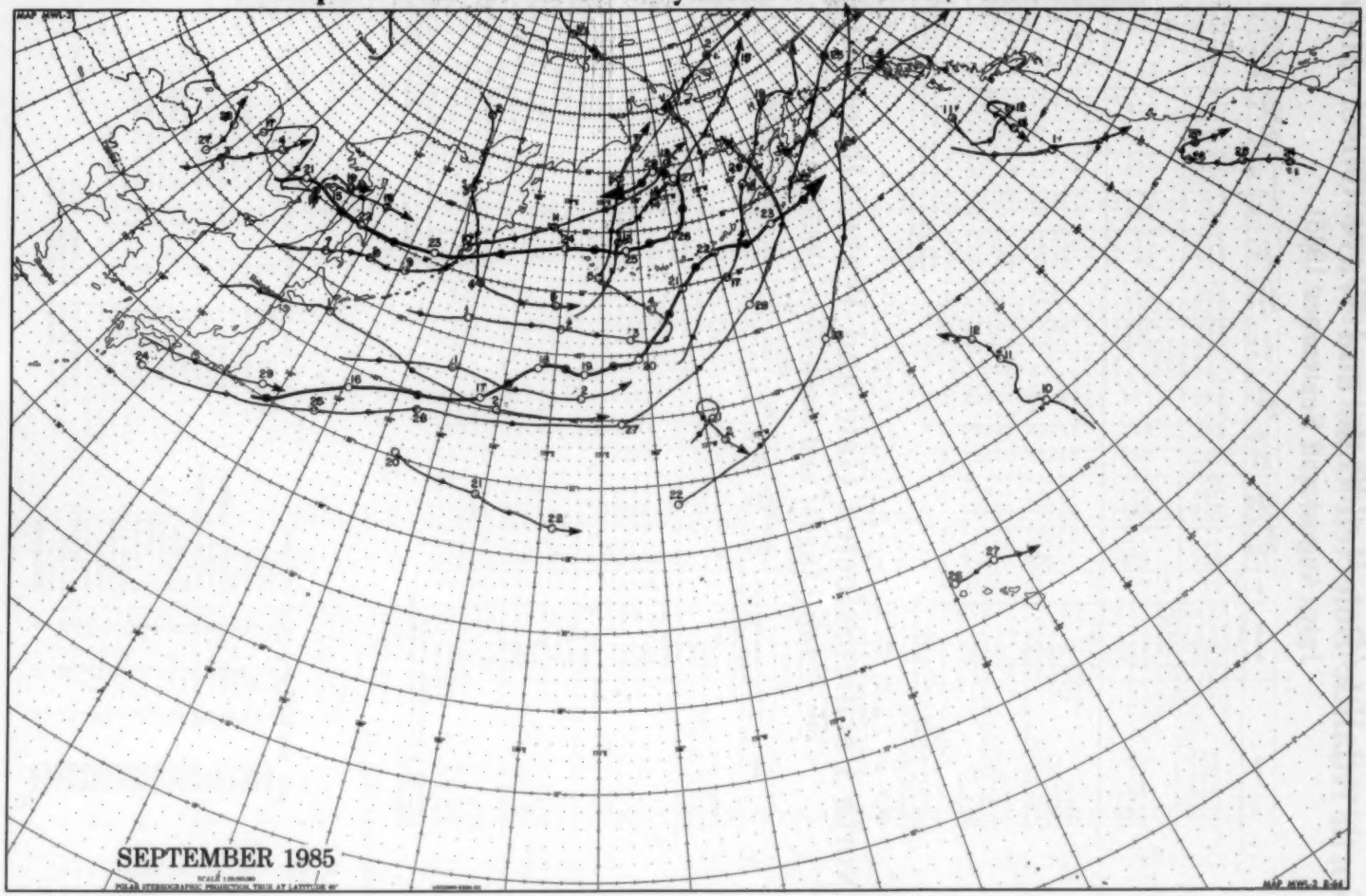
Principal Tracks of Centers of Cyclones at Sea Level, North Pacific



Closed circle indicates 0000 and open circle 1200 GMT positions. Square indicates stationary center. Cyclone tracks marked with heavy line are described in the Weather Log.

North Atlantic Selected Gale and Wave Observations
July, August and September 1985

Vessel	Nationality	Date	Position of Ship Lat. deg.	Position of Ship Long. deg.	Time GMT	Wind Dir. 10°	Wind Speed kt.	Visibility n. mi.	Present Weather code	Pressure mb	Temperature °C Air	Temperature °C Sea	Sea Waves* Period sec.	Sea Waves* Height ft.	Swell Waves Dir. 10°	Swell Waves Period sec.*	Swell Waves Height ft.
	ATLANTIC	JULY															
DYUI SKAGERAK	DUVB	21	20.0 N	16.2 W	18	35	N 48	5 NM	02	1015.0	22.0	21.0	5	10	20	10	24.5
DYUI SKAGERAK	DUVB	22	21.0 N	17.6 W	00	36	N 52	10 NM	00	1011.0	20.5	20.0	5	19.5	35	10	24.5
DYUI SKAGERAK	DUVB	23	25.9 N	14.9 W	00	02	N 53	2 NM	05	1012.5	20.0	19.0	6	16.5	02	10	24.5
	ATLANTIC	AUG.															
USNS MAUMEE	NSNF	17	58.6 N	45.3 W	00	05	45	10 NM	02	1007.5	6.7	6.7	15	19.5	05	20	29.5
SEALAND PRODUCER	WJBJ	23	48.1 N	14.9 W	18	32	40	5 NM	25	1016.0	15.0	13.3	5	13	28	8	19.5
PANAMA	KPDL	29	25.5 W	84.7 W	21	14	55	200 YD	63		24.4	30.0	10	24			
	ATLANTIC	SEP.															
DANDY #1	3ESB2	3	38.9 N	24.4 W	17	18	N 45				16.2	18.0	4	11.5	18	8	21
RAINBOW HOPE	KNPB	6	58.6 N	40.7 W	18	05	40	2 NM	61	0999.0	7.6	7.6	4	16.5	05	5	19.5
RAINBOW HOPE	KNDB	7	55.6 N	42.3 W	00	03	40	1 NM	55	0997.2	8.9	8.4	4	16.5	04	5	19.5
EXPORT FREEDOM	WCJS	20	40.3 N	33.3 W	12	29	45	10 NM	01	1015.0	21.0	22.7	5	11.5	29	6	19.5
WASHINGTON TRADER	KMJH	23	36.3 N	74.2 W	12	33	40		18		23.5	26.7	9	6.5	33	6	19.5
ADDIRIYAH	HZLL	27	36.8 N	72.4 W	12	17	N 53	.5 NM	21	0997.0	25.0	30.0	8	13	17	15	65.5
OMI DYNACHEM	KNJK	27	39.0 N	72.9 W	12	17	N 60	5 NM	02	1003.3	25.0	18.9	6	21	17	8	19.5
SEALAND DEVELOPER	KMPH	27	39.6 N	72.9 W	12	19	N 75	1 NM	65				12	19.5	14	12	24.5
TROPIC SUN	KLHC	27	37.0 N	68.7 W	18	20	50	5 NM	03	1013.0	26.2	27.2	6	14.8	20	10	19.5
FORTALEZA	WEWM	27	37.2 N	71.5 W	18	20	47	5 NM	00	1009.0	27.2	20.6	8	13	21	11	21
SEALAND VOYAGER	KMPA	28	47.0 N	34.5 W	12	32	40	5 NM	02	0999.9	12.6	16.0	10	10	32	32	52.5

+ Direction of sea waves same as wind.
X Direction or period of waves indeterminate
N Measured wind

NOTE: The observations are selected from those with winds ≥ 40 kn or waves ≥ 20 ft from April through September and 45 kn or 30 ft October through March.

North Pacific Selected Gale and Wave Observations
July, August and September 1985

Vessel	Nationality	Date	Position of Ship Lat. deg.	Position of Ship Long. deg.	Time GMT	Wind Dir. 10°	Wind Speed kt.	Visibility n. mi.	Present Weather code	Pressure mb	Temperature °C Air	Temperature °C Sea	Sea Waves* Period sec.	Sea Waves* Height ft.	Swell Waves Dir. 10°	Swell Waves Period sec.*	Swell Waves Height ft.
	PACIFIC	JULY															
SEALAND FREEDOM	WGJW	1	34.4 N	142.8 E	00	20	N 47	1 NM	63	0995.4	25.4		8	14.5	21	10	19.5
PRESIDENT EISENHOWER	KRJD	1	38.2 N	144.8 E	04	21	N 50	.5 NM	63	0988.0	20.0		7	23	21	7	19.5
PRESIDENT HOOVER	WTST	1	38.4 N	143.6 E	06	26	N 52	5 NM	02	0986.5	23.3	16.7	12	23	20	13	19.5
	PACIFIC	AUG.															
EXXON HOUSTON	KMBA	11	47.1 N	128.6 W	18	36	N 40			1025.2	16.6	17.8	8	21			
AQUARIUS	WSKJ	12	29.0 N	129.9 E	00	16	N 40	5 NM		0998.0			8	8	16	9	19.5
M/V UNI MODEST	HPXZ	20	45.1 N	160.9 E	06	06	N 42	3 NM	07	1011.0	12.5	12.0	9	14.5	04	12	19.5
SEALAND PATRIOT	KMRF	23	22.9 N	123.7 E	00	20	N 42	5 NM	02	0994.5	31.0		4	16.5	18	8	23
MARGARET LYNES	KRJL	23	24.0 N	122.9 E	12	21	50	5 NM	00	0995.0	28.3	26.0	8	16.5	21	12	24.5
	PACIFIC	SEP.															
MARGARET LYNES	KRJL	3	43.1 N	179.3 W	06	19	40	.5 NM	45	1000.8	18.3	15.5	7	19.5	18	7	16.5
MELBOURNE HIGHWAY	3EPW?	5	53.2 N	173.8 E	05	36	N 47	1 NM	91	0984.5	9.0	9.0	8	24.5	36	10	29.5
ARCO SPIRIT	KHLD	17	51.6 N	132.7 W	12	32	42	10 NM	01	1014.0	11.1	13.9	5	14.8	32	9	19.5
HOEGH GENE	LMOS	17	43.9 N	164.7 E	19	09	49	1 NM	97		14.0	11.0	10	18	07	12	39
HOEGH GENE	LMDG	18	44.0 N	165.5 E	04	09	47	2 NM	97		12.0	10.0	9	18	10	15	36
LAKE SUWA	DUEE	18	54.5 N	169.6 W	12	31	N 50	2 NM	81	1000.0	8.0	8.0	6	11.8	32	10	19.5
POLAR ALASKA	5LEU	18	54.2 N	162.5 W	18	29	N 60	5 NM	07	0996.0	8.0	8.0	12	23			
POLAR ALASKA	5LEU	19	54.3 N	164.5 W	00	27	N 45	10 NM	01	1010.0	8.0	7.0	14	19.8			
CORNELIA MAERSK	OVPU	24	46.2 N	173.3 E	06	18	45	.25 NM	65	1002.5	11.8	10.0	8	18	18	9	23
AMERICA SUN	WNEJ	26	47.0 N	176.3 E	06	29	N 45			1003.2	9.2	9.4	5	10	29	11	24.5

+ Direction of sea waves same as wind
X Direction or period of waves indeterminate
N Measured wind

NOTE: The observations are selected from those with winds ≥ 40 kn or waves ≥ 20 ft from April through September and 45 kn or 30 ft October through March.

CONTINUED FROM PAGE 53

CALL SIGN	TOTAL	BATHY	TESAC	SHIP NAME
VKNN	3	3	0	***
VKMS	517	517	0	COOK
VKPT	120	120	0	PERTH
VKYJ	55	55	0	***
VP49	180	180	0	AIRCRAFT SQUADRON
VXN	47	47	0	AIRCRAFT
WCGN	30	30	0	CHEVRON CALIFORNIA
WECB	7	7	0	MELVILLE
WHVF	19	19	0	ALBATROSS IV
WTDF	37	37	0	T. CROMWELL
WTDK	13	13	0	D.S. JORDAN
WTDN	9	9	0	N. FREEMAN
WTDO	114	114	0	OREGON II
WTEA	31	31	0	DISCOVERER
WTED	25	25	0	CHAPMAN
WTEF	9	9	0	RAINIER
WTEG	22	22	0	MT. MITCHELL
WTEK	19	19	0	DAVIDSON
WTEQ	3	3	0	PEIRCE
WTER	74	74	0	RESEARCHER

CALL SIGN	TOTAL	BATHY	TESAC	SHIP NAME
WTES	23	23	0	SURVEYOR
WTEW	19	19	0	WHITING
WXG73	12	12	0	PETER ANDERSON
WYL57	2	2	0	DREW FOSS
WY8082	1	1	0	DAY STAR
WZE39	56	56	0	NOAA WAVE
WZL81	66	66	0	WESTWARD
Y3CW	12	0	12	A. V. HUNBOLDT
5EVS	23	23	0	SOUTH ISLANDER
5NCB	4	4	0	PACHECHANY
7JBJ	68	68	0	RICHMOND BRIDGE
7JOB	15	15	0	SHINKASHU MARU
7KDD	6	6	0	***
8JNZ	69	69	0	KOFU MARU

TOTAL BATHYS	RECEIVED	8260
TOTAL TESACS	RECEIVED	1368
TOTAL REPORTS	RECEIVED	9628

U.S. Voluntary Observing Ship Weather Reports

July, August and September 1985

SHIP NAME	VIA RADIO	VIA MAIL
ACADIA	44	108
ACADIA FOREST	89	92
ACONCAGUA		51
ACT 111	80	
ACT 5	28	
ACT 7	77	
ACT I	133	
ACT IV	127	
ADABELLE LYKES	134	103
ADDIRIYAH	56	30
ADM. WM. F. CALLAGHAN	19	138
ADMIRALTY BAY	7	288
ADONIS	127	194
AFRIC STAR	61	
AL AHMADIAH	130	199
ALAMEDA	71	315
ALASKA MARU	45	
ALBULA	25	122
ALDEN W.CLAUSEN	16	
ALEMANIA EXPRESS	39	
ALEUTIAN DEVELOPER	53	199
ALMERIA LYKES	83	111
ALNUDENA	1	103
ALPINE ROSE	24	45
ALVA MAERSK	18	109
AMADEUS	9	43
AMARANTE	3	
AMELIA TOPIC	24	247
AMERICA EXPRESS	36	
AMERICA SUN	19	14
AMERICAN ALABAMA	69	233
AMERICAN APOLLO	74	105
AMERICAN AQUARIUS	38	171
AMERICAN ARGO	83	144
AMERICAN ASTRONAUT	60	63
AMERICAN CONDOR	137	278
AMERICAN DRACO	54	146
AMERICAN EAGLE	55	
AMERICAN ENVOY	60	183
AMERICAN HERITAGE	18	70
AMERICAN LANCER	104	214
AMERICAN LARK	189	97
AMERICAN LEGION	57	266
AMERICAN LIBERTY	79	162
AMERICAN LYNX	118	340
AMERICAN MAINE	64	171
AMERICAN MARKETER	69	269
AMERICAN MERCHANT	133	179
AMERICAN MONARCH	19	
AMERICAN NEBRASKA	4	22
AMERICAN NEW JERSEY	65	13
AMERICAN NEW YORK	63	271
AMERICAN OKLAHOMA	45	216
AMERICAN PIONEER	62	246
AMERICAN PURITAN	108	224
AMERICAN RESERVIST	95	178
AMERICAN RESOLUTE	15	81
AMERICAN SKY	53	
AMERICAN SPITFIRE	79	
AMERICAN TITAN AK 1008	97	190
AMERICAN TRADER	72	61
AMERICAN TROJAN	56	87
AMERICAN VEGA	39	162
AMERICAN VIRGINIA	71	96
AMERICANA	16	
AMOCO BALTIMORE	48	
AMOCO CAIRO	43	
AMOCO YORKTOWN	52	46
ANDERSON		261
ANJA LEONHARDT	25	66
ANNIE JOHNSON	4	
AQUA CITY	114	
AQUA GARDEN	2	181
AQUARIUS	107	240
ARCHON	6	
ARCO ALASKA	50	51
ARCO CALIFORNIA	55	25
ARCO HERITAGE	57	145
ARCO INDEPENDENCE	11	4
ARCO PRUDHOE BAY	56	130
ARCO SPIRIT	13	15
ARCO TEXAS	43	60
ARCTIC SLAVOR	2	141
ARCTIC TOKYO	57	307
ARGONAUT	44	150
ARIES	7	
ARMAND HAMMER	59	141
AROSIA	79	179
ARTHUR M. ANDERSON	3	3
ASHLEY LYKES	5	81
ASIA HERON	32	
ASIA INDUSTRY	60	
ASIA MARU	124	
ASIA WINDS	33	
ASPEN	16	35
ASTORIA	18	86
ATIGUN PASS	157	130
ATLANTIC OCEAN	1	
ATLANTIC RAINBOW	4	
ATLANTIC SAGA	15	
ATLANTIC SONG	28	
AUSTANGER	42	67
AUSTRAL RAINBOW	17	88
AUSTRALIA	80	
AXEL JOHNSON	25	
AZTECA	23	
B.T. ALASKA	71	
B.T. SAN DIEGO	142	408
BALDER CARRIER	9	
BALLARD		98
BALTIMORE TRADER	103	294
BANGLAR KAKOLI	1	
BAR° ZAN	29	78
BARBER PERSEUS	38	
BARBER PRIAM	89	128
BARBER TAIF	7	
BARBER TAMPA	22	36
BARBER TEXAS	3	99
BARBER TOBA	29	58
BARBER TONSBERG	3	
BARRYDALE	48	129
BAY BRIDGE	18	5
BEAUJOLAIS	57	101
BEAUTEOUS	14	
BEISHU MARU	108	62
BERNINA	55	221
BHARATENDU	15	
BIBI	54	
BIEML TRADER		36
BLUE COSMO	141	108
BOGASARI DUA	87	239
BOGASARI EMPAT	123	219
BOGASARI LIMA	153	322
BOHEME	100	20
BORINQUEN	61	309
BRIGHT SUN	143	227
BRINTON LYKES	43	50
BROOKS RANGE	53	106
BUNGA CHEMPAKA	97	213
BUNGA KESIDANG	7	
BUNGA MELAWIS	63	159
BUNGA SRIPAGI	122	222
BURNS HARBOR		133
CALCITE II	125	116
CALIFORNIA BRIDGE	99	166
CALIFORNIA RAINBOW	61	206
CALPICE TRANSPORT		17
CANADIAN HIGHWAY	128	88
CAP ANAMUR	8	
CARLA A. HILLS	2	165
CAROLINE JANE	187	216
CASON J. CALLAWAY	13	
CAVARA	196	321
CECILIE MAERSK	43	123
CENPAC 2	97	154
CGM LORRAINE	14	
CHARLES LYKES	151	228
CHARLES M. BEEGHLEY	155	210
CHARLES PIGOTT		150
CHARLOTTE LYKES	170	300
CHARLOTTE MAERSK	102	262
CHASTINE MAERSK	60	248
CHELSEA	145	261
CHEMICAL PIONEER	44	26
CHERRY VALLEY	43	22
CHESAPEAKE	46	342
CHESAPEAKE TRADER	124	275
CHESNUT HILL	70	132
CHEVRON ARIZONA	48	
CHEVRON BURNABY	45	
CHEVRON CALIFORNIA	127	117
CHEVRON COLORADO	18	50
CHEVRON COPENHAGEN	42	205
CHEVRON EDINBURGH	21	30
CHEVRON FELUY	158	399
CHEVRON FRANKFURT	11	
CHEVRON FREEPORT	17	89
CHEVRON-LONDON		284
CHEVRON LOUISIANA	22	83
CHEVRON MISSISSIPPI	192	234
CHEVRON OREGON	24	92
CHEVRON PACIFIC	42	208
CHEVRON WASHINGTON	62	249
CHRISTIAN MAERSK	28	115
CHRISTINA	63	
CHUEN ON	31	84
CITADEL HILL	58	
CITY OF MIDLAND	32	449
CITY OF PERTH	127	145
CLARA MAERSK	29	179
CLEMENTINA	9	
CLIFFORD MAERSK	3	92
CLOVER TRUST	66	144
COLIMA	5	70
COLORADO HIGHWAY	160	3
COLUMBIA STAR	70	273
COLUMBUS AMERICA	494	
COLUMBUS AUSTRALIA	32	
COLUMBUS CALIFORNIA	39	
COLUMBUS LOUISIANA	62	
COLUMBUS NEW ZEALAND	87	
COLUMBUS VICTORIA	35	
COLUMBUS VIRGINIA	75	
COLUMBUS WELLINGTON	39	
CONCORDIA SUN	7	37
CONDORA	3	
CONTINENTAL HIGHWAY	91	
CONTINENTAL TRADER	74	
COOP EXPRESS II	54	60
COOP EXPRESS V	28	
COPIAPO	22	54
CORNELIA MAERSK	80	202
CORNUCOPIA	68	198
CRYSTAL STAR	25	21
CYGNUS	162	338
D.L. BOWER		259
DA MOSTO	28	96
DACEBANK	59	
DAGLAND	15	22
DANDY #1	1	24
DART AMERICA	44	
DAVID PACKARD	24	
DAWN	104	209
DELAWARE TRADER	153	295
DELTA MAR	14	
DIANA	1	58
DILKARA	39	
DOCTOR LYKES	36	150
DON JUAN	62	128
DON PAFU	30	
DRAGOR MAERSK	69	210
DREW FOSS		7
DUBHE	8	
DUSSELDORF EXPRESS	33	
DYUI KATTEGAT	28	73
DYUI SKAGERAK	3	110
EASTERN BRIDE	129	176
EASTERN DIAMOND	1	
EASTERN FRIENDSHIP	108	150
EASTERN GLORY	55	188
EASTERN GRACE		162
EASTERN MOON	5	
EASTERN ROYAL	140	109
EASTERN VENTURE	44	73
EATON GLORIA	134	
ECLIPSE	6	28
EDGAR B. SPEER		301
EDGAR M. QUEENY	6	
EDITA	14	
EDWIN H. GOTT		319
ELBE EXPRESS		131
EMPIRE STATE	21	
ENDEAVOR	55	100
ERLANGEN EXPRESS	22	
ERNEST R BREECH	195	236
ESSO BAYONNE	2	
ESSO PALM BEACH	2	58
ESTHER SCHULTE	58	57
EVER GATHER		62
EVER GENIUS	35	45
EVER GENTLE	17	34
EVER GIFTED	22	9
EVER GLOBE	2	4
EVER GLORY	33	180

SHIP NAME	VIA RADIO	VIA MAIL
EVER GRACE	33	63
EVER GRAND		4
EVER GUARD	69	
EVER LAUREL	49	264
EVER LEVEL	57	
EVER LINKING	40	67
EVER LIVING		58
EVER LOADING	16	53
EVER LYRIC	23	33
EVER SHINE	80	158
EVER SPRING	2	32
EVER SUMMIT	95	235
EVER SUPERB	101	135
EVER TRUST	8	14
EVER VALOR	110	293
EVER VALUE	69	74
EVER VIGOR	33	149
EVER VITAL	133	208
EXPORT CHALLENGER	10	33
EXPORT CHAMPION	45	63
EXPORT FREEDOM	70	201
EXPORT PATRIOT	45	110
EXXON BALTIMORE	23	62
EXXON BATON ROUGE	19	46
EXXON BAYTOWN		4
EXXON BENICIA	24	34
EXXON BOSTON	129	114
EXXON CHARLESTON	2	
EXXON GETTYSBURG	13	29
EXXON HOUSTON	60	136
EXXON JAMESTOWN	19	10
EXXON LEXINGTON	67	75
EXXON NEW ORLEANS	6	33
EXXON NORTH SLOPE	23	80
EXXON PHILADELPHIA	72	88
EXXON PRINCETON	56	113
EXXON SAN FRANCISCO	21	33
EXXON WASHINGTON	9	49
EXXON WILMINGTON	8	
EXXON YORKTOWN	2	18
FALCON TRADER	10	12
FALSTRIA	156	
FEDERAL FRASER	15	44
FEDERAL LAKES	64	124
FERNCROF	46	139
FETISH		56
FJORD STAR	13	50
FLORIDA RAINBOW	24	97
FORTALEZA	152	295
FRANCIS SINCERE NO. 6	34	
FRIENDSHIP	74	
FROTASIRIUS	7	
GALVESTON	120	290
GAS LIBRA	1	
GAZANIA	28	56
GEMINI	155	333
GENERAL M.BELGRANDO	11	
GENEVIEVE LYKES	10	43
GEORGE A. SLOAN	73	54
GEORGE A. STINSON		215
GEORGE H.WEYERHAEUSER	110	245
GERONIMO		86
GLACIER BAY	95	256
GLOBAL FRONTIER	35	74
GLOBAL PIONEER	16	83
GLOBAL SPLENDOR	74	110
GLOBAL SUN	22	
GOLD BOND CONVEYOR	1	
GOLDEN APO	44	
GOLDEN BLISS	56	
GOLDEN ENDEAVOR		101
GOLDEN GATE	41	53
GOLDEN GATE BRIDGE	33	
GOLDEN HAWK	100	143
GOWA	4	
GREAT LAND	59	38
GREAT OCEAN	96	141
GREEN AUKLET	15	
GREEN FOREST	75	81
GREEN ISLAND	5	61
GREEN MASTER	88	212
GREEN MAYA	57	142
GREEN STAR	93	
GREEN VALLEY	50	24
GREEN WAVE	38	120
GYPSUM COUNTESS	55	
GYPSUM KING	122	
H. LEE SELVY	207	
HAKUSAN MARU	51	
HAMANASU	26	99
HANJIN BUSAN	3	
HANJIN CHEJU		56
HANJIN INCHEON	21	
HANJIN KUNSAN	2	16
HANJIN KWANGYANG	22	84
HANJIN POHANG	38	
HARDANGER	6	
HASSAN MERCHANT	20	33
HEILBRONN	1	
HENRY FORD II		58
HERBERT C. JACKSON	23	29
HIEI MARU	81	
HIKAWA MARU	111	
HIRA MARU	137	
HO-SHO	16	
HOEGH CAIRN	9	
HOEGH CLIPPER	6	
HOEGH DENE		13
HOEGH DUKE	80	
HOEGH DYKE	13	
HOEGH MARLIN	65	76
HOEGH MASCOT	1	6
HOEGH MINERVA	3	45
HOEGH MIRANDA	24	103
HONSING ARROW	13	42
HONSING BREEZE	81	52
HOLLIS HEDBERG	2	
HOTAKA MARU	81	
HOYO MARU	13	3
HUAL TRACER		405
HYUGA MARU	54	
HYUNDAI # 14	18	
HYUNDAI #17	1	
HYUNDAI #3	61	65
HYUNDAI #7	18	30
HYUNDAI CON # 22	9	
HYUNDAI CON #7	60	92
IMPERIAL	11	32
INCOTRANS PACIFIC	21	
INCOTRANS SPIRIT	36	
INGER	15	63
IRIS ISLAND	91	
IRVING ARCTIC	7	
IRVING L. CLYMER	15	13
ISLAND PRINCESS	139	
ITALICA	38	16
IVAN TOPIC	9	47
J.A.W. IGLEHART	69	41
J.L. MAUTHE	71	59
J.T. HIGGINS		298
JADRAN	1	
JALAGOVIND	19	
JALAMOKAMBI	7	
JALAVIHAR	33	
JALAVIJAYA	81	
JAMES LYKES	25	
JAMES R. BARKER		267
JAPAN ALLIANCE	79	
JAPAN AMBROSE	166	121
JAPAN APOLLO	96	104
JEAN LYKES	32	61
JOHN G. MUNSON	165	127
JOHN LYKES	9	
JOSEPH L. BLOCK		302
JOSEPH LYKES	9	72
JUNO	3	
JUPITER NO. 1	58	
KAMNIK	41	
KASINA	66	97
KASTURBA	50	20
KAUAI	74	300
KEIYO	26	
KENAI	105	406
KENNETH E. HILL	41	264
KENNETH T.DERR	33	126
KENT	4	73
KENWOOD	56	109
KEYSTONE CANYON	31	
KEYSTONER	31	243
KISO MARU	80	
KNORR	44	57
KOFUKU MARU	47	24
KOLN EXPRESS	31	
KOREAN FIR	19	11
KOREAN JACEWON	120	221
KOREAN PRIDE	20	
KOREAN WONIS JIN	34	44
KOREAN WONIS ONE	44	41
KOREAN WONIS SEVEN	39	37
KOREAN WONIS SUN	32	35
KUROBE MARU	100	
L.W. FUNKHOUSER	76	103
LAKE SUWA	70	181
LANAI	38	
LARS MAERSK	90	231
LASH ATLANTICO	47	107
LASH ITALIA	16	152
LASH PACIFICO	31	101
LAURA MAERSK	69	162
LAUST MAERSK	40	140
LEDA MAERSK	78	221
LEISE MAERSK	62	134
LESLIE LYKES	41	142
LETITIA LYKES	61	241
LEWIS WILSON FOY		397
LEXA MAERSK	47	78
LICA MAERSK	12	84
LILLOOET	146	186
LILLY STAR	40	110
LING LEO	70	215
LIONS GATE BRIDGE	97	
LNG TAURUS	9	210
LONG LINES	122	328
LOTUS ACE	18	
LOUIS MAERSK	65	146
LOUISE LYKES	139	188
LT. ODYSSEY	133	43
LUCENT STAR	210	
LUNA MAERSK	59	152
LURLINE	155	333
LUZON	48	110
M. P. GRACE	7	
M/V BHAVABHUTI	80	81
M/V DOCK EXPRESS TEXAS	10	103
M/V IZOLA	91	95
M/V SANKO CRYSTAL		53
MAERSK CLEMENTINE	18	
MAERSK SENTOSA	8	
MAERSK WAVE	95	148
MAERSK WIND	54	128
MAHARSHI KARVE	3	
MAIN EXPRESS	170	
MAJ STEPHEN W. PLESS	10	1
MALACCA	9	
MALAYAN PRINCESS	61	41
MALLORY LYKES	39	189
MAMMOTH FIR	26	113
MANHATTAN DUKE	1	
MANILA PACIFIC	105	
MANUKAI	90	291
MANULANI	72	298
MARATHA PROVIDENCE	117	291
MARATHA SHOGUN	36	
MARCONA CONVEYOR	43	36
MARDI GRAS	5	24
MARGARET JOHNSON	25	
MARGARET LYKES	162	368
MARIA TOPIC	15	112
MARITIME NOBLE	106	184
MARJORIE LYKES	2	25
MARTHA R. INGRAM	105	209
MATARAM	1	
MAUI	149	316
MAWASH TAPUK	1	
MELBOURNE HIGHWAY	4	12
MELVILLE	147	228
MENINA BARBARA	4	
MEONIA	135	13
MERAK EIGHTY	51	36
MICRONESIAN COMMERCE		174
MICRONESIAN INDEPENDEN	51	13
MIHO MARU	150	34
MING GALAXY		57
MING GLORY	26	
MING MERCY	7	
MING MOON		64
MING OCEAN	57	100
MING STAR	9	10
MING SUN	18	69
MING UNIVERSE	1	
MIXTECO	51	109
MOANA PACIFIC	167	84
MOBIL ARCTIC	160	449
MOBIL MERIDIAN	78	232
MOKU PAHU	304	290
MORMACSTAR	55	
MORMACSUN	12	17
MOSEL EXPRESS	151	
MOSMAN STAR	82	84
MV TIBER	5	
MYRON C. TAYLOR	113	151
NACIONAL MONCHIQUE	33	35
NANCY LYKES	69	160
NATIONAL DIGNITY	59	
NATIONAL PRIDE	5	
NAVIGATOR		387
NEDLLOYD ELBE	91	
NEDLLOYD KEMBLA	91	
NEDLLOYD KIMBERLEY	79	
NEDLLOYD KINGSTON	80	
NEDLLOYD ROCHESTER	17	
NEDLLOYD ROSARIO	52	
NEDLLOYD ROTTERDAM	18	
NEDLLOYD ROUEN	45	
NEPTUNE AMBER	58	89
NEPTUNE CONCORD	27	
NEPTUNE CORAL	41	
NEPTUNE DIAMOND	172	143
NEPTUNE KIKU	16	
NEPTUNE PEARL	77	64
NEPTUNE TOURMALINE	36	131

SHIP NAME	VIA RADIO	VIA MAIL
NESTOR 1	21	
NEW HORIZON		145
NEW INDEPENDENCE	107	341
NEW JERSEY MARU	68	
NEW YORK MARU	62	
NEWARK	78	243
NICOLA PROSPERITY	64	
NICOLET	53	88
NISSAN LAUREL	20	
NISSAN MARU	34	
NISSHU MARU	9	
NO. 6 HO MING		152
NOAA DAVID STARR JORDA	97	216
NOAA SHIP ALBATROSS IV	78	294
NOAA SHIP CHAPMAN	65	138
NOAA SHIP DAVIDSON	292	311
NOAA SHIP DELAWARE II	139	365
NOAA SHIP DISCOVERER O	222	93
NOAA SHIP FAIRWEATHER	350	383
NOAA SHIP FERREL	88	84
NOAA SHIP MCARTHUR	12	14
NOAA SHIP MILLER FREEM	265	350
NOAA SHIP MT MITCHEL	109	361
NOAA SHIP OREGON II	285	340
NOAA SHIP PEIRCE	121	188
NOAA SHIP RAINIER	351	308
NOAA SHIP RESEARCHER	319	
NOAA SHIP RUDE S90	57	
NOAA SHIP SURVEYOR	231	429
NOAA SHIP T. CROMWELL	355	410
NOAA SHIP WHITING	364	873
NOORDAM	4	
NORDHVAL	147	
NORDIC PRINCE	3	
NORWAY	12	44
NOSAC EXPRESS	53	138
NOSAC SEL	13	402
NOSAC VERDE	88	122
OAK SUN	50	103
OAKLAND	46	119
OBERON	26	10
OCEAN CHEER	48	80
OCEAN STEELHEAD	61	74
OCEANIC	185	336
OCTA	9	13
OGDEN WABASH	3	
OLEANDER	254	304
OLGA TOPIC	48	218
OMI DYNACHEM	1	13
ORANGE BLOSSOM	30	140
ORCHID #2		388
ORCO TRADER	229	140
OREGON BRIDGE	115	98
ORIENTAL DIPLOMAT	21	
ORIENTAL EDUCATOR	107	107
ORIENTAL EXECUTIVE	34	200
ORIENTAL EXPLORER	18	139
ORIENTAL GOVERNOR	51	9
ORIENTAL KNIGHT	35	59
ORIENTAL MINISTER	6	118
ORIENTAL PATRIOT	58	53
ORIENTAL PRINCE	33	
ORIENTAL SOVEREIGN	11	
ORIENTAL TAIO	53	
OVERSEAS ALICE	82	139
OVERSEAS ARCTIC	164	118
OVERSEAS BOSTON	180	267
OVERSEAS CHICAGO	16	198
OVERSEAS JUNEAU	50	
OVERSEAS MARILYN	21	
OVERSEAS NATALIE	15	36
OVERSEAS NEW YORK	157	151
OVERSEAS OHIO	1	
OVERSEAS VIVIAN	61	37
OVERSEAS WASHINGTON	83	266
PACBARON	41	
PACBARONESS	42	
PACDUCHESS	12	
PACDUKE	44	12
PACEMPEROR	43	21
PACGLORY	7	
PACIFIC ANGEL	79	106
PACIFIC ARROW	209	120
PACIFIC EXPRESS	13	6
PACIFIC HIGHWAY	78	
PACIFIC LIGHT	11	76
PACIFIC PRIDE		2
PACIFIC PRINCESS	81	
PACIFIC RAINBOW	44	106
PACIFIC SAGA	72	
PACIFIC SUNSHINE	3	42
PACIFIC VENTURE	127	16
PACIFIC VICTORY	53	121
PACIFIC WING	70	
PACKING	30	
PACMAJESTY	3	5
PACMERCHANT	40	
PACMONARCH	20	47
PACNOBLE	43	
PAN DYNASTY	3	
PANAMA	96	339
PARALLA	39	94
PATRIOT	24	
PAUL H. CARNAHAN	21	
PAUL PIGOTT	1	
PAUL THAYER		24
PEGGY DOW	111	
PENNSYLANIA RAINBOW	67	
PENNSYLVANIA SUN	64	124
PENNSYLVANIA TRADER	5	
PERUVIAN REEFER	8	12
PFC EUGENE A.OBREGON	10	26
PHILADELPHIA	25	187
PHILADELPHIA SUN	68	72
PHILIP R CLARKE	241	152
PHILIPPINE VICTORY	18	138
PILAR	7	58
PING CHAU		3
PITTSBURGH	35	4
PLANTIN	53	
POLAR ALASKA	4	59
POLYNESIA	202	450
PONCE	7	36
PORTLAND	58	33
POTOMAC TRADER	6	
PRESIDENT CLEVELAND	20	15
PRESIDENT EISENHOWER	119	277
PRESIDENT F. ROOSEVELT		159
PRESIDENT GRANT	120	226
PRESIDENT HOOVER	131	174
PRESIDENT JACKSON	52	57
PRESIDENT JEFFERSON	148	276
PRESIDENT JOHNSON	132	
PRESIDENT KENNEDY	72	57
PRESIDENT LINCOLN	165	332
PRESIDENT MADISON	97	294
PRESIDENT MC KINLEY	163	224
PRESIDENT MONROE	124	312
PRESIDENT PIERCE	53	14
PRESIDENT TAYLOR	42	204
PRESIDENT TRUMAN	14	
PRESIDENT TYLER	91	188
PRESIDENT WASHINGTON	239	277
PRESIDENT WILSON	22	
PRESQUE ISLE		376
PRINCE OF TOKYO	57	299
PRINCE WILLIAM SOUND	88	58
PROSPERIDAD	39	
PUNTA BRAVA	36	78
QUATSINO SOUND	47	314
QUEEN ELIZABETH II	67	
QUEEN OPAL	130	32
QUEENS WAY BRIDGE	74	
RAINBOW HOPE	2	323
RAPID	107	145
RED ARROW	17	
REGENT CEDAR	26	
REGINA MAERSK	57	203
RHEIN EXPRESS	36	
RIO ESQUEL	17	19
RIO FRIO	1	
RIO GRANDE	26	19
RIO LOS SAUCES	16	2
RIO TEUCO	48	82
ROACHBANK	178	
ROBERT D. CONRAD	30	
ROBERT E. LEE	36	11
ROGER M. KYES		39
ROSINA TOPIC	3	
ROTTERDAM	20	
ROYAL PRINCESS	30	
ROYAL VIKING STAR	3	
RUHR EXPRESS	23	
RUTH LYKES	8	
S.S.CHILBAR	9	35
S.S.TONSINA	1	
S.T. CRAPO	33	166
SAINT LOUIS	85	222
SAM HOUSTON	9	
SAMMI AURORA		8
SAMRAT ASHOK	58	
SAMUEL H. ARMACOST	21	51
SAN FRANCISCO	13	
SAN JUAN	156	267
SAN PEDRO	66	326
SANGKULIRANG VII	19	
SANKO AZALEA	144	100
SANKO CAMPANULA	43	
SANKO CHERRY	23	26
SANKO CYCLAMAN	60	134
SANKO DEFIANT	3	36
SANKO DENEB	1	
SANKO DRAKE	24	
SANKO ETERNITY	6	
SANKO HEART	6	
SANKO MOON	84	357
SANKO PEARL	93	
SANKO TOPAZ	8	
SANKO TURQUOISE	1	
SANKO VENUS	12	
SANTA ADELA	69	150
SANTA CRUZ II	14	
SANTA FE	1	
SANTA JUANA	152	306
SAPPHIRE GLORY	50	156
SATURN DIAMOND	34	98
SAUDI DIRIYAH	38	
SAVONITA	9	36
SCANDINAVIAN HIGHWAY	103	
SEA BELLS		3
SEA DIAMOND	21	
SEA FAN	34	119
SEA FORTUNE	1	288
SEA JADE	88	76
SEA LANTERN	39	81
SEA LIGHT	6	219
SEALAND ADVENTURER	120	293
SEALAND CONSUMER	65	260
SEALAND DEFENDER	34	42
SEALAND DEVELOPER	76	88
SEALAND ECONOMY	45	276
SEALAND ENDURANCE	91	194
SEALAND EXPLORER	56	234
SEALAND EXPRESS	91	46
SEALAND FREEDOM	89	248
SEALAND INDEPENDENCE	90	193
SEALAND INNOVATOR	150	281
SEALAND LEADER	79	215
SEALAND LIBERATOR	36	208
SEALAND MARINER	15	17
SEALAND PACER	39	160
SEALAND PATRIOT	94	262
SEALAND PIONEER	75	232
SEALAND PRODUCER	68	272
SEALAND VENTURE	94	292
SEALAND VOYAGER	40	97
SEDCO/BP 471	129	183
SENATOR	61	35
SEVEN OCEAN	56	
SGT.MATEJ KOCAK	12	34
SHELDON LYKES	135	259
SHELLY BAY		255
SHENAMON	53	53
SHIN BEISHU MARU	34	
SHINKASHU MARU	37	
SHIRLEY LYKES	12	19
SILVER CLIPPER	38	75
SILVER SHINKO	9	4
SINGAPORE VICTORY	2	
SIOUX TATE	4	
SKAUGRAN	76	187
SKOUBORG	43	221
SOLON TURMAN	15	
SONG OF NORWAY	126	
SOUTHLAND STAR	87	
SPARROWS POINT	58	105
SPIRIT OF LIBERTY	12	
SPRING BIRD	53	74
SPRING BREEZE		21
SPRING BRIDE		495
ST. CLAIR		17
STAR DIEPPE	115	
STAR DOVER	92	56
STAR EAGLE	62	35
STAR HONGKONG	83	12
STAR KANDA	62	68
STAR MINDANAN	8	
STAR THAILAND	7	33
STARWARD	120	
STELLA LYKES	23	73
STJERNEBORG	9	
STONEWALL JACKSON	54	
STREAM BOLLARD	19	14
STREAM BUSUANGA	66	145
STUTTGART EXPRESS	15	
SUGAR ISLANDER	11	94
SUN VIKING	106	21
SUNBELT DIXIE	201	82
SUNSET PEAK	28	71
TAI LIENG	1	
TENCHBANK	84	
TEQUILA MOONSHINE		203
TEXACO CALIFORNIA		27
TEXACO CONNECTICUT	27	28
TEXACO FLORIDA	9	
TEXACO GEORGIA	58	160
TEXACO NEW YORK	36	
TEXACO RHODE ISLAND	24	18
TEXAS CLIPPER	13	
TEXAS SUN	13	9
TEXAS TRADER	100	61
TFL DEMOCRACY	39	210
TFL ENTERPRISE	43	215
TFL EXPRESS	45	189

SHIP NAME	VIA RADIO	VIA MAIL
TFL FRANKLIN	137	
TFL FREEDOM	72	258
TFL INDEPENDENCE	70	162
TFL JEFFERSON	41	187
TFL LIBERTY	76	149
THOMAS G. THOMPSON	130	373
THOMAS WASHINGTON	9	39
THOMPSON LYKES	7	12
THOMPSON PASS	18	102
TILLIE LYKES	96	105
TOMBEI MARU	84	
TOKYO MARU	21	
TOKYO RAINBOW	95	30
TONCI TOPIC		72
TONIC VENTURE	5	
TONSONIA	66	427
TOWER BRIDGE	154	59
TOYOTA MARU 10	77	
TOYOTA MARU 11	72	
TOYOTA MARU 15	105	
TOYOTA MARU NO 17	30	
TOYOTA MARU NO 18	41	
TRADER	44	51
TRANSCOLUMBIA	84	
TRANSOCEAN PROGRESS	18	
TRAVE ORE	27	43
TRIGGER	29	
TRITON	38	219
TROPIC SUN	22	70
TROPICALE	145	262
TUNISAN REEFER		1
TYSON LYKES	71	241
UNI-MASTER	86	42
UNI-MERCY	3	
UNI-MODEST	77	145
UNICORN		448
UNITED SPIRIT	21	
UNIVERSE	4	
USCGC ACUSHNET WMEC 16	8	
USCGC ALERT (WMEC 630)	40	
USCGC BASSWOOD (WLB 38	107	166
USCGC BIBB (WMEC 31)	60	191
USCGC BOUTWELL WMEC 71	72	79
USCGC BUTTONWOOD WLB 3	4	
USCGC CHEROKEE WMEC 16	23	
USCGC CHILULA (WMEC 15		181
USCGC CITRUS (WMEC 300	4	170
USCGC CLOVER (WMEC 292	21	68
USCGC COURAGEOUS	40	
USCGC DALLAS (WMEC 716	6	
USCGC DEPENDABLE	61	
USCGC DILIGENCE WMEC 6	129	
USCGC DURABLE (WMEC 62	12	35
USCGC EAGLE (WIX 327)	101	157
USCGC EVERGREEN WMEC 2	6	
USCGC FIREBUSH WLB 393	4	
USCGC GLACIER (WAGB 4)	11	11
USCGC HAMILTON WMEC 71	2	
USCGC INGHAM (WMEC 35)	16	
USCGC IRONWOOD (WLB 29	53	
USCGC JARVIS (WMEC 726		22
USCGC LAUREL (WLB 291)	2	3
USCGC MALLOW (WLB 396)	88	
USCGC MELLON (WMEC 717	14	
USCGC MIDGETT (WMEC 72		119
USCGC MORGENTHAU	16	
USCGC MUNRO (WMEC 724)	3	
USCGC NORTHWIND WAGB 2	215	6
USCGC POLAR SEA WAGB 1	242	
USCGC RELIANCE WMEC 61	93	267
USCGC RESOLUTE WMEC 62	12	
USCGC RUSH (WMEC 723)	216	42
USCGC SEDGE (WLB 402)	25	
USCGC SHERMAN (WMEC 72	12	
USCGC STEADFAST WMEC 6	62	
USCGC SWEETBRIER WLB 4	35	
USCGC TAMAROA (WMEC 16	69	53
USCGC TANEY (WMEC 37)	11	
USCGC UNIMAK (WTR 379)	2	
USCGC VALIANT (WMEC 62	37	
USCGC VENTUROUS WMEC 6		149
USCGC VIGOROUS WMEC 62	3	
USCGC WOODRUSH (WLB 40	4	
USCGC YOCONA (WMEC 168	33	
USGS S.P. LEE	233	159
USNS APACHE (T-ATF 172	52	
USNS BARTLETT(T-AGOR 1	130	194
USNS BELLATRIX	4	53
USNS CAPELLA	6	
USNS CHAUVENET	158	288
USNS DE STEIGUER	85	161
USNS HARKNESS (T-AGS 3	87	
USNS KANE TAGS 27	6	
USNS LYNCH (T-AGOR 7)	18	
USNS MAUMEE	76	158
USNS MOHAWK (T-ATF 170	104	97
USNS NEOSHO (T-AO 143)		144
USNS PASSUMPSIC TAO 10		59
USNS PONCHATOULA	11	
USNS POWHATAN TATF 166		77
USNS RANGE SENTINEL		8
USNS REDSTONE	26	
USNS SATURN		23
USNS SEALIFT ANTARCTIC		85
USNS SEALIFT ARCTIC	145	220
USNS SEALIFT CARIBBEAN	39	141
USNS SEALIFT CHINA SEA	209	216
USNS SEALIFT MED	39	39
USNS SEALIFT PACIFIC	171	
USNS SILAS BENT T-AGS	2	3
USNS SPICA (T-AFS 9)		68
USNS TRUCKEE (T-AO 147		281
USNS VANGUARD TAG 194	77	138
USNS WACCAMAW(TAG-109)		231
USNS WYMAN (T-AGS 34)	2	
VALLEY FORGE	32	313
VALOR	49	
VAN CONQUEROR	1	
VAN FORT	16	
VAN HAWK	109	136
VAN WARRIOR	15	43
VELENJE	1	
VENTURE STAR	57	
VICTORY ACE	159	249
VISHVA BHAKTI	6	
VISHVA PAROO	1	
VISHVA PRAFULLA	12	13
W.C. VAN HORNE	60	
WALCHAND	16	
WASHINGTON RAINBOW 82	6	104
WASHINGTON TRADER	93	243
WECOMA	17	48
WELLINGTON STAR	55	
WESTERN HIGHWAY	24	
WESTERN SUN	32	222
WESTOCEAN	361	
WESTWARD VENTURE	6	41
WESTWOOD MERCHANT		21
WILLIAM CLAY FORD		256
WILLIAM E. HUSSMAN	101	439
WILLIAM J. DELANCEY		266
WILLIAM R. ROESCH		198
WILLOWBANK	77	
WOLVERINE		11
WORLD PROBITY	3	
YAMASHIN MARU	120	53
YASHIMA MARU	102	71
YE LAN	31	76
YOUNG SCOPE	42	
YOUNG SPROUT	28	
YUKO MARU	20	66
ZAPATA ARCTIC	28	
ZAPATA COURIER	5	
ZEELANDIA	84	
ZEPHUNTER	15	
ZEUS	1	
ZIM GENOVA	37	
ZIM HAIFA	19	
ZIM HONGKONG	28	
ZIM HOUSTON	13	
ZIM IBERIA	15	
ZIM KEELUNG	57	
ZIM MARSEILLES	19	
ZIM MIAMI	18	
ZIM NEW YORK	15	
ZIM SAVANNAH	27	
ZIM TOKYO	50	
ZOELLA LYKES	15	50
3EMB2	18	
3EIO3		2
3EKN3	64	134
3ELX		27
3EMQ2		115
3EQ3		2
3FXS2	159	
6ZDA		10
8ZDI	3	93
8ZZL	1	
ELDV4		83
KNGS	38	
KRBS	23	7
KRJF	81	56
KSNH		49
OXNS		34
OXTH	9	5
WCTS		1
WIAQ	38	166
WLRK	32	183
WNSF	67	179
WYLS718		46
ZCUD	3	
ZEUQ	53	93

SUMMARY: GRAND TOTAL VIA RADIO 55599 GRAND TOTAL VIA MAIL 91013 TOTAL UNIQUE OBS 119448

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SEPTEMBER 1985

SQUARE	LAT	LONG	OBS	WAVE HEIGHTS (METERS) MAX	DY	HR	MEAN	FREQUENCY OF WAVE HEIGHTS (%) CLM	1-1.5M	2-2.5M	3-3.5M	4-4.5M	5-7.5M	8-9.5M	10.5M+
410021	32.3N	075.3W	706	14.0	26	20	2.0	13.0	40.0	27.0	12.3	3.7	1.8	0.6	1.8
410061	29.3N	077.3W	695	6.0	25	11	2.0	7.7	42.3	32.2	10.8	7.7	1.4	0.4	
420011	28.9N	080.7W	714	5.5	15	11	1.8	48.2	42.7	12.6	3.2				
420021	26.0N	093.5W	717	4.0	30	19	1.2	27.1	52.9	16.3	3.3	0.1			
420031	26.6N	085.9W	594	3.5	15	03	1.2	31.1	53.9	10.9	4.0				
420071	30.1N	080.9W	525	4.0	02	12	0.9	38.4	54.3	4.8	2.3	0.1			
440041	38.8N	070.7W	414	3.0	01	03	1.3	4.2	73.1	19.3	3.2				
440051	42.7N	068.4W	712	4.5	28	02	1.2	19.4	72.0	6.7	2.0	1.8	0.3		
440071	43.8N	070.1W	681	4.0	28	00	0.8	49.8	45.8	3.7	0.6	1.2	0.2		
440111	41.1N	066.6W	717	7.5	28	08	1.7	3.6	59.8	25.7	6.8	3.2	1.8		
440511	48.0N	087.4W	619	3.5	24	13	1.0	49.4	38.4	4.1	4.6	1.2			
450021	45.3N	086.3W	114	3.5	30	22	0.7	58.7	41.2						
450031	45.3N	082.8W	613	2.5	01	11	0.9	48.3	47.3	3.3					
450041	47.0N	084.8W	579	4.0	24	07	1.0	44.8	48.9	6.3	3.3	1.0			
450091	41.6N	082.9W	228	1.5	11	04	0.7	61.4	38.5						
460061	47.3N	090.0W	623	3.5	24	06	0.9	55.2	31.6	8.9	3.1				
460071	48.7N	087.1W	637	3.0	24	01	0.9	37.3	46.2	8.2	5.1				
460081	44.3N	087.8W	726	4.5	24	07	0.7	30.0	60.0	8.8	0.1				
460111	56.3N	140.3W	716	6.5	19	11	2.6		23.3	40.6	19.8	14.9	1.2		77.4
460121	42.6N	130.3W	716	4.5	12	11	2.3		28.1	58.9	10.9	1.9			
460131	51.9N	179.1W	716	7.0	29	02	2.5		21.5	49.2	23.1	5.3	1.5		
460141	50.9N	135.9W	716	4.5	04	21	2.2		31.8	57.3	7.3	3.5			
460151	46.1N	131.0W	292	3.5	18	17	1.7		55.8	39.7	4.4				
460161	40.8N	137.6W	717	3.5	12	09	1.8		40.3	46.6	9.2				
460181	46.2N	126.2W	696	4.0	12	20	1.6	3.7	49.6	40.6	5.3	0.1			
460211	36.9N	120.9W	694	2.5	14	23	1.4		43.7	46.2					
460221	37.4N	122.7W	718	3.5	14	23	1.3	0.1	39.8	48.2					
460231	38.2N	123.3W	698	3.0	14	23	1.7		34.4	49.8	2.4				
460241	39.2N	124.0W	699	3.5	19	04	1.7		34.4	35.3	10.1				
460251	40.5N	124.5W	709	4.5	05	03	1.9		27.9	38.7	19.7	3.5			
460331	34.3N	120.5W	709	3.0	15	08	1.6		39.3	54.2	6.4				
460341	32.8N	119.5W	706	3.5	15	16	1.6		39.4	37.3	7.8				
460351	33.6N	119.0W	716	2.5	03	04	2.0	16.0	41.1	2.7					
460361	37.8N	122.7W	709	2.0	15	02	1.1	3.9	94.6	1.4					
460381	35.8N	121.9W	718	3.0	15	01	1.7		57.3	38.9	3.7				
460391	57.0N	177.7W	377	6.0	25	11	2.0	1.3	53.0	22.0	9.6	13.5	0.2		
510011	23.4N	162.3W	715	3.0	10	14	1.9		32.1	67.2	0.5				
510021	17.2N	157.8W	718	3.0	01	00	1.9		32.4	59.6	8.9				
510031	19.2N	160.8W	711	2.5	01	07	1.7		57.6	42.3					
510041	17.5N	152.5W	715	3.5	07	04	2.1		21.8	48.3	9.7				
CHL121	36.9N	075.7W	716	6.0	27	10	1.0	30.9	60.1	9.1	0.4	0.5	0.2		

BATHY-TESAC Data Received at NMC

October, November and December 1985

This listing represents BATHY-TESAC messages received at the Specialized Oceanographic Center (SOC), located at the U.S. National Meteorological Center (NMC). These ships participate in the collection and exchange of Integrated Global Ocean Services System (IGOSS) Data on the Global Telecommunications System (GTS).

Additional information on this program can be obtained by contacting:

John J. Kundrat, Jr.
National Meteorological Center
Room 206
Camp Spring, Maryland 20233
Phone 301-763-8133

CALL SIGN	TOTAL	BATHY	TESAC	SHIP NAME
A8SL	4	4	0	PACDUKE
A8VI	1	1	0	PACDUCHESS
A8WW	17	17	0	KOREAN FIR
BQDV	1	1	0	***
BNUB	6	6	0	XIANG YANGHUNG 14
CGBS	5	2	3	PARIZEAU
C7C	6	0	6	OCEAN STATION CHARLIE
C7L	118	118	0	OCEAN STATION LIMA
C7R	154	154	0	OCEAN STATION ROMEO
DBBF	4	4	0	WEGA
DBBN	57	57	0	METEOR
DBFJ	21	21	0	FRITHJOF
DBFR	176	176	0	ANTHON DOHRN
DBKV	89	89	0	SEETEUFEL
DBLK	110	110	0	POLARSTERN
DCH	5	5	0	ELBE 1
DCL	8	8	0	FEHMARNBELT-FEUERSCHIFF
DDIV	14	14	0	NEDLLOYD VAN DIEMEN
DDLH	28	28	0	TEL ADAMS
DONA	38	38	0	***
DFCG	30	30	0	SONNE
DGFR	91	91	0	MONTE OLIVIA
DGLM	27	27	0	MONTE ROSA
DGRL	27	27	0	RIKA
DGSR	26	26	0	MONTE SARIENTO
DGVK	58	58	0	COLUMBIA VICTORIA
DGZV	83	83	0	COLUMBUS VIRGINIA
DHCW	62	62	0	COLUMBUS WELLINGTON
DUWZ	12	12	0	MICRONESIAN COMMERCE
DVRX	1	1	0	MICRONESIAN INDEPENDENCE
D5NZ	53	53	0	POLYNESIA
ELBO9	2	2	0	ARCO RESOLUTION
ELXF	4	4	0	KOREAN PRIDE
EREA	149	98	51	MONSOON
EREB	238	128	110	VOLNA
EREH	142	37	105	PRIBOI
ERRI	302	148	154	OCEAN
ERRS	38	24	14	BUGAEV
ERRT	232	132	100	GEORGE OUSHAKOV
ERRU	76	51	25	ERNST KRENKEL
EWEL	54	1	53	POISK
FAVL	1	1	0	***
FNBF	4	4	0	ROSTAND
FNCW	37	37	0	ROUSSEAU
FNGB	6	6	0	MARION DUFRESNE
FNGS	55	55	0	LAFAYETTE
FNIB	2	2	0	THALASSA
FNKJ	1	1	0	POINTE NADAME
FNUI	1	1	0	***
FNXE	37	37	0	RODIN
GDLS	1	1	0	***
GOTC	3	3	0	CALIFORNIA STAR
GOVL	13	13	0	ACT 4
GOVN	46	46	0	DILKARA
GWUK	14	14	0	STARELLA
GZKA	12	12	0	ACT 3
HCJH	8	8	0	ISLA FLOREANA
HPAN	28	28	0	***
HPEW	25	25	0	PACIFIC ISLANDER
H9DG	14	14	0	***
JBES	38	38	0	YAMASHIN MARU
JBNS	66	66	0	HIKAWA MARU
JBOA	24	24	0	KEIFU MARU
JCDF	5	5	0	SOYO MARU
JCDT	3	3	0	AMERICA MARU
JCIN	6	6	0	TOKYO MARU
JCLL	52	52	0	LIONS GATE BRIDGE
JCOD	40	40	0	S.ZYO
JCZF	43	43	0	NOTAKA MARU
JDOC	84	84	0	HIEI MARU
JDRD	5	5	0	SHOYU MARU
JENN	92	92	0	ASIA MARU
JFDG	90	90	0	SHUMPU MARU
JFGZ	3	3	0	***
JFZG	84	84	0	HAKUSAN MARU
JGDU	1	1	0	***
JGFN	76	76	0	PACIFIC ARROW
JGZK	115	115	0	RYOFU MARU
JHJE	22	22	0	GUKENS WAY BRIDGE
JIOW	10	10	0	ALASKA MARU
JJZC	13	13	0	HAKONE MARU
JLRV	16	16	0	PACIFIC TRADER
JNVF	13	13	0	KAIYO MARU
JPQX	51	51	0	CHOFU MARU
JPVB	64	64	0	SEIFU MARU
JQXW	15	15	0	HIEBU MARU
KEOC	4	4	0	EDGAR M. QUEENY
KIYO	31	31	0	EXXON JAMESTOWN
KNBO	3	3	0	DELAWARE II
NAAO	60	60	0	GLACIER
NAGO	10	10	0	JARVIS
NBTN	95	95	0	POLAR STAR
NOWA	15	15	0	MORGENTHAU
NRKF	15	15	0	LYNCH
NGDF	41	41	0	MUNRO
NGZV	1	1	0	***
NHOC	10	10	0	CURTS
NHPA	3	3	0	***
NHTE	7	7	0	***
NMMR	12	12	0	MIDGETT
NIKA	24	24	0	SEALIFT ATLANTIC
NIZX	33	33	0	HARSHFIELD
NLVB	2	2	0	RUSH
NMMJ	2	2	0	SHERMAN
NMST	10	10	0	MAHLON S. TISDALE
NOTH	3	3	0	HALYBURTON
NPCR	7	7	0	DALLAS
NQST	1	1	0	SEALIFT ARCTIC
NRFJ	50	50	0	NORTHWIND
NRUO	10	10	0	POLAR SEA
NSVN	58	58	0	***
NTBK	1	1	0	***
OXYL	19	19	0	BAMSA DAN
PACH	20	20	0	PACIFIC MISSILE RANGE
PGDG	19	19	0	NEDLLOYD KINGSTON
PGDU	34	34	0	NEDLLOYD KIMBERLEY
PGOF	53	53	0	NEDLLOYD KEMBLA
PJYG	81	81	0	OLEANDER
PLAT	151	151	0	PLATFORM
SBCG	1	1	0	***
SCOR	3	3	0	TV 241
SCOU	6	6	0	TV 243
SCOV	8	8	0	TV 244
SCPE	8	8	0	TV 253
SCPH	7	7	0	TV 257
SCPK	1	1	0	TV 260
SCQG	3	3	0	TV 265
SEKN	4	4	0	TV 227
SEKO	7	7	0	TV 278
SEKW	2	2	0	***
SEYD	7	7	0	TV 274
SEZA	4	4	0	TV 276
SHIP	696	696	0	NO SHIP CALL SIGN REC'D
SNPF	2	2	0	TV 361
SJIB	1	1	0	***
SJTG	1	1	0	***
SJTR	3	3	0	TV 271
SKVG	1	1	0	***
SKVP	3	3	0	***
SKVQ	1	1	0	***
SNPN	6	6	0	AXEL JOHNSON
SNZJ	9	9	0	TV 105
SNZQ	3	3	0	TV 103
SOPK	1	1	0	***
STTR	1	1	0	***
TFEA	34	34	0	BJARNI SAEMUNDSSON
TFJA	38	38	0	ARNI FRIDRIKSSON
UBNZ	66	66	0	SHULEYKIN AKADEMIK
UEAK	65	31	34	***
UHQB	133	62	71	ACADEMIC KOROLEV
UJBJ	2	2	0	***
UJPO	103	96	7	NULTANOVSKIY PROF
UJWX	2	2	0	***
UJQV	2	2	0	***
UJSX	1	1	0	***
UKGF	1	1	0	***
UNAY	223	113	110	ACADEMIC SHIRSHOV
UNFW	116	116	0	PROF. ZUBOV
UNWZ	1	0	1	MIRNY
UPUI	71	71	0	***
URYN	98	0	98	RUDOLF SAMOILOVICH
USOP	72	0	72	NIKOLAI KONONOV
UUBE	1	1	0	***
UUPB	152	77	75	AKADEMIK M. SHOKALSKIY
UUQR	50	20	30	HOLCHANOV PAVEL PRO
UVWN	206	132	74	YAKOV GAKKEL
UWEC	152	67	85	KHROMOV PROFESSOR
UZGH	187	109	78	PASSAT
VC9616	12	12	0	LADY HAMMOND
VKCK	87	87	0	STUART
VKCN	98	98	0	CANBERRA
VKDA	60	60	0	DARWIN
VKLA	146	146	0	ADELAIDE
VKLB	92	92	0	HOBART
VKMK	83	83	0	***
VKML	23	23	0	SNIPE

CONTINUED ON PAGE 48

U.S. NDBC Climatological Data

July, August and September 1985

JULY 1985 — AIR TEMPERATURE (DEG C) — SEA TEMPERATURE (DEG C) — AIR-SEA TEMPERATURE DIFFERENCE (DEG C)

BUOY	LAT	LONG	OBS	DAYS	MAX	DY	HR	MIN	DY	HR	MEAN	OBS	DAYS	MAX	DY	HR	MIN	DY	HR	MEAN	OBS	DAYS	MAX	DY	HR	MIN	DY	HR	MEAN
41001	34.9N	072.9W										739	31	28.7120	201		23.8102	091		26.51									
41002	32.3N	075.3W										742	31	29.9131	211		26.4101	011		28.01									
41006	29.1N	077.3W										611	26	30.4109	231		27.1101	111		28.01									
42001	25.9W	089.7W										698	30	31.5120	081		27.9103	071		29.11									
42002	26.0W	093.6W										269	11	31.3129	221		27.8105	181		29.01									
42003	26.0W	085.9W										743	31	32.1109	221		27.9101	101		29.11									
42007	30.1N	088.8W										741	31	30.9114	221		23.6106	091		27.81									
44004	38.5N	070.7W										740	31	28.3121	181		20.6104	091		25.01									
44005	42.7N	068.4W										742	31	19.2130	221		11.7101	041		15.51									
44007	43.5N	070.1W										740	31	19.6113	201		10.3101	051		14.01									
44008	40.5N	069.5W										744	31	20.3119	161		11.7101	091		15.81									
44009	38.5W	074.6W										744	31	24.5113	201		16.7101	211		21.71									
44011	41.1N	066.5W										742	31	21.3119	181		10.7101	131		15.61									
44012	39.0N	074.4W										737	31	25.0121	191		19.1102	011		22.31									
44014	36.6W	075.5W										741	31	26.9126	201		22.5101	081		24.81									
45001	48.0N	087.8W										624	02	07.9131	191		07.1131	091		07.51									
45002	45.3N	086.3W										712	31	19.6114	211		09.7101	061		15.51									
45003	45.3N	082.8W										738	31	19.2119	221		07.1101	011		13.61									
45004	47.2N	086.5W										675	29	08.6131	001		03.3127	101		06.31									
45005	41.7N	082.4W										741	31	26.2129	231		19.9101	101		22.31									
45006	47.3W	090.5W										741	31	18.4131	011		03.1101	021		06.91									
45007	42.7N	087.1W										742	31	21.1127	191		13.6101	121		19.21									
45008	44.3N	082.4W										744	31	19.5120	231		10.2101	031		15.31									
46011	34.9N	120.9W										744	31	16.6130	231		08.7106	161		10.01									
46012	42.5N	124.3W										740	31	16.8116	021		10.1101	071		15.71									
46013	38.2N	123.3W										738	31	16.8107	201		09.7106	151		11.81									
46014	39.2N	124.0W										739	31	15.8131	041		10.0117	091		11.91									
46022	40.8N	124.5W										741	31	16.9112	201		09.7126	131		11.81									
46023	34.3N	120.7W										733	31	17.4126	231		12.5105	121		14.61									
46024	32.3N	119.5W										740	31	19.2110	221		16.0114	061		17.81									
46025	33.8N	119.1W										741	31	21.5130	211		17.4108	081		19.41									
46026	37.8N	122.7W										737	31	16.6101	231		11.2106	191		12.61									
46027	41.8N	124.4W										740	31	15.5109	231		08.2116	071		11.21									
46028	35.7N	121.9W										738	31	18.5127	231		11.3114	121		13.81									
46029	46.1N	124.5W										743	31	15.8109	221		09.1101	191		11.21									
46030	39.2N	124.5W										743	31	08.1126	031		05.9105	061		06.41									
46042	36.8N	122.5W										744	31	19.2126	011		04.3101	071		08.51									
51001	23.4N	162.3W										742	31	27.9114	021		25.6110	161		26.01									
51002	17.2N	157.8W										744	31	26.8127	221		25.9101	061		26.11									
51003	19.2N	160.8W										743	31	27.1116	121		26.0102	101		26.61									
51004	17.5N	152.5W										741	31	26.2124	181		24.9102	111		25.71									
ALEF1	25.0N	067.0W										740	31	31.2117	201		27.7125	121		29.21									
CHLV2	36.9N	076.0W										739	31	26.0122	211		20.5102	021		25.41									
FPSN3	30.5N	087.6W										743	31	28.6120	201		24.6106	111		26.61									
GDIL1	29.3N	089.9W										578	26	31.4114	211		26.0117	261		29.11									
LKFF1	26.6N	080.0W										744	31	29.5117	161		25.0124	071		27.71									
SVLS1	32.0N	064.7W										744	31	29.6123	211		27.0102	111		28.21									

JULY 1985 — PRESSURE (MB) — WIND SPEEDS (KNOTS) — MEAN WIND SPEED (KNOTS)

BUOY	LAT	LONG	OBS	DAYS	MAX	DY	HR	MIN	DY	HR	MEAN	OBS	MAXIDY	HR	DIR	N	NE	E	SE	S	SW	W	NW	TOTAL
41001	34.9N	072.9W	740	31	1024.8125	151		1011.7109	221		1017.51	732	17	11	061	180	4.31	4.71	4.81	5.11	6.91	10.21	7.71	5.81	08.81
41002	32.3N	075.3W	740	31	1027.3125	161		1012.6112	091		1019.61	735	1	23101	231	220	6.51		2.01	9.61	9.11	10.51	8.91	8.51	09.71
41010	29.3N	077.5W	611	26	1025.2102	261		1014.9117	091		1020.41	593	1	26123	171	247	5		3.61	5.61	6.81	9.11	7.51	7.21	08.31
42001	25.9W	089.7W	698	30	1031.6103	081		1012.4117	071		1016.51	694	1	24106	121	150	5.21	5.61	7.21	8.41	8.01	9.01	6.01	6.81	07.01
42002	26.0N	093.6W	270	11	1027.5102	191		1013.6109	251		1017.21	264	1	29106	111	090	11.11	14.41	11.71	12.91	12.81	8.31	8.81	11.41	12.21
42003	26.0N	085.9W	743	31	1027.6102	161		1010.5102	091		1017.11	715	1	29121	151	240	9.21	7.91	6.61	7.11	8.61	6.61	6.61	9.01	08.21
42007	30.1N	088.8W	741	31	1027.6108	171		1011.7103	231		1017.21	713	1	18106	171	225	6.51	5.81	5.21	7.51	8.01	7.81	7.91	8.21	07.61
44004	38.5N	070.7W	741	31	1026.7125	021		1009.4109	231		1017.01	744	1	28127	111	230	12.41	14.81	14.21	10.01	13.91	14.51	11.31	9.91	13.31
44005	42.7N	068.4W	742	31	1027.7125	131		1005.3102	211		1015.41	726	1	20126	221	190	7.11	9.11	9.01	9.61	9.31	8.91	5.91	5.01	08.01
44007	43.5N	070.1W	740	31	1025.5101	111		1002.3102	211		1014.01	673	1	29126	161	160	5.61	7.31	6.11	6.91	12.01	10.81	7.11	6.31	09.61
44008	40.6N	069.5W	744	31	1027.5125	041		1007.5102	091		1016.21	716	1	19126	171	220	7.31	7.81	5.91	6.31	10.61	10.11	6.91	4.01	08.81
44009	38.5N	074.6W	744	31	1026.8124	161		1008.5102	081		1016.61	727	1	25126	221	190	8.41	10.51	8.71	8.21	11.61	7.61	5.91	5.21	09.61
44011	41.1N	066.5W	742	31	1026.5125	131		1007.3102	151		1016.91	732	1	25127	121	220	6.51	7.21	4.31	6.31	8.31	8.31	6.61	6.31	07.41
44012	39.0N	074.4W	739	31	1027.4126	171		1007.6102	231		1016.91	737	1	26127	121	220	6.51	11.41	9.61	8.11	11.11	9.21	6.31	5.61	09.61
44013	42.6N	070.3W	741	31	1026.5101	171		1005.1102	211		1015.11	737	1	21115	091	220	5.11	5.11	5.41	6.41	7.91	6.61	5.41	5.01	07.91
44014	36.6N	075.5W	026	02	1022.6171	151		1020.9191	111		1022.01	076	1	26130	221	170	2.01	1.61	2.61	4.01	3.61	3.01	4.01	2.01	03.21
44022	44.6N	066.7W	715	31	1025.4130	161		1005.7102	211		1014.91	704	1	21115	111	210	5.11	5.61	5.11	5.61	6.11	6.11	5.61	5.41	05.91
45001	45.3N	087.8W	740	31	1024.8131	161		1002.4105	111		1013.71	717	1	20123	091	320	5.71	5.21	4.61	5.01	9.11	6.61	5.71	4.71	07.91
45002	47.2N	086.5W	678	29	1025.7131	161		1002.1105	071		1013.61	667	1	15125	011	190	6.71	4.51	5.91	7.01	8.21	6.01	5.81	7.21	06.81
45003	41.7N	082.4W	739	31	1024.5117	161		1007.1105	231		1015.61	735	1	21115	111	250	5.11	5.11	5.11	5.61	7.21	5.61	5.11	4.91	07.91
45006	47.3N	090.5W	741	31	1024.6132	161		1001.6104	171		1013.41	735	1	16104	161	270	4.01	4.01	4.11	5.61	4.31	5.51	6.51	5.21	05.21
45007	42.2N	087.1W	743	31	1027.7117	161		1001.6104	231		1015.01	717	1	25131	171	060	7.31	9.01	8.91	8.01	6.61	6.11	6.01	6.01	07.51
45008	44.3N	082.4W	743	31	1024.5137	161		1003.6105	071		1013.91	737	1	24131	141	060	6.91	8.21	7.01	7.01	8.01	6.61	6.01	6.01	07.41
46011	34.9N	120.9W	744	31	1027.7126	231		999.3101	231		1018.21	727	1	24131	141	070	6.91	9.21	11.61	11.11	10.61	10.41	9.61	5.91	10.31
46012	42.5N	124.3W	740	31	1026.7113	191		1011.7107	121		1020.41	715	1	22129	021	340	14.31	8.11	6.01	10.21	10.31	9.51	7.11	12.71	12.31
46013	38.2N	123.3W	738	31	1024.7112	221		997.5101	141		1016.41	715	1	25130	121	320	12.41	8.11	6.01	9.21	10.31	9.51	6.01	12.71	11.81
46014	39.2N	124.0W	744	31	1029.4126	071		1008.2105	231		1021.21	724	1	16130	091	130	8.51	6.81	7.71	6.71	7.71	9.21	8.61	9.91	08.51
46022	40.8N	124.5W	744	31	1029.4113	211		1011.6104	191		1021.61	712	1	16131	071	130	14.11	9.41	11.81	11.71	10.11	9.21	9.21	13.61	12.31
46023	34.3N	120.7W	733	31	1027.5127	231		1011.4107	251		1019.41	704	1	29130	141	270	11.11	9.41	9.51	9.01	10.01	10.01	9.51	8.61	13.81
46024	32.3N	119.5W	740	31	1029.8113	191		1010.7106	121		1018.61	706	1	16104	221	180	10.21	9.11	9.01	8.21	9.11	9.81	9.01	8.91	08.81
46025	33.8N	119.1W	741	31	1029.5119	201		1011.0104	161		1019.81	706	1	19123	011	320	6.31	2.81	3.31	1.71			4.71	10.81	09.91
46026	37.8N	122.7W	742	31	1027.6102	211		1009.7104	111		1019.61	737	1	21106	121	330	5.71	3.91	3.01	4.01	6.41	5.71	5.01	6.71	07.81
46027	41.8N	124.4W	733	31	1027.3102	231		1008.6104	121		1015.61	687	1	23105	011	300	5.61	3.01	2.61	6.31	2.71	5.11	5.11	12.21	09.71
46028	35.7N	121.9W	739	31	1027.6102	211		1009.5105	231		1016.61	716	1	24116	091	340	10.51	3.01	3.61	5.21	6.21	3.31	5.61	11.01	09.31
46029	46.1N	124.5W	743	31	1026.8127	161		1010.4104	191		1018.41	743	1	27113	051	320	9.71	4.71	4.51	2.81	2.51	2.91	5.21	15.71	14.11
46030	39.2N	124.5W	743	31	1026.0127	231		1007.4107	231		1015.31	741	1	25105	151	130	10.61	9.61	9.61	13.21	9.11	8.31	7.01	6.71	09.01
46042	36.8N	122.5W	744	31	1029.6110	191		1010.3103	231		1019.51	744	1	24116	091	250	10.11	4.51	2.11	3.41	7.21	5.61	3.81	6.71	08.11
46047	32.9N	119.5W	735	31	1029.9117	161		1010.5104	091		1019.91	732	1	27113	051	320	9.71	4.71	4.51	2.81	2.51	2.91	5.21	15.71	14.11
46053	34.2N	119.9W	740	31	1028.0110	211		1009.5104	231		1019.11	718	1	24113	051	310	3.71	3.61	4.01	4.01	4.01	4.21	7.61	13.41	10.51
46054	34.3N	120.5W	740	31	1027.6110	191		1007.4104	231		1018.21	719	1	24103	031	290	3.71	4.01	3.61	3.91	4.71	7.31	5.11	6.31	05.91
46059	37.9N	129.7W	737	31	1022.4102	191		1010.3104	111		1016.01	733	1	22104	201	290	7.61	9.21	7.71	5.41	10.01	10.01	11.91	09.11
46071	41.8N	124.4W	742	31	1028.4110	091		1008.1105	231		1017.11	700	1	27114	001	330	17.11	1.21	2.61	3.41	3.51	2.01	3.01	11.51	08.71
46072	40.5N	124.5W	738	31	1028.5132	191		1010.0104	171		1018.21	719	1	22104	221	310	6.41	2.11	1.91	3.11	3.21	2.21	2.61	15.11	13.61
46073	40.9N	124.5W	743	31	1022.7110	181		1009.7105	231		1016.31	600	1	23114	121	350	12.51	1.21	1.21	6.01	7.01	1.11	1.41	9.91	09.71
46084	56.5N	161.7W	744	31	1029.5126	211		995.1101	211		1018.61	744	1	32107	061	200	9.61	7.61	5.21	10.01	14.01	9.61	5.31	11.91	10.61
46072	52.5N	170.8W	744	31	1029.2106	091		1012.6109	161		1020.61	744	1	32107	061	200	9.61	8.01	6.41	10.91	13.21	10.41	8.21	11.91	10.41
46083	59.1N	167.9W	744	31	1026.5109	101		992.5101	161		1015.31	744	1	35106	071	190	9.11	10.31	13.21	14.31	15.31	9.41	9.41	10.11	12.81
51000	23.6N	162.3W	742	31	1021.3120	091		1015.2113	011		1018.41	742	1	22129	161	090	7.61	13.41	13.41	10.61					13.31
51001	23.4N	162.3W	742	31	1019.4104	291		1012.6109	161		1016.01														
51003	19.2N	160.8W	742	31	1019.0106	091		1013.8109	231		1016.21	742	1	19129	201	090		11.21	10.61	9.81	10.01				14.01
51004	17.5N	152.5W	741	31	1017.3120	091		1010.1105	191		1014.01	741	1	25125	221	060		14.31	13.61	8.91					14.01
ALEF1	25.0N	067.0W	740	31	1027.5105	241		1012.7107	251		1019.41	742	1	31117	201	350	5.21	6.31	9.71	8.41	8.41	12.01	5.41	2.61	09.41
ALSN6	40.5N	073.8W	742	31	1027.2126	151		1007.1102	061		1016.41	733	1	21126	101	220	9.01	10.31	6.31	7.21	9.81	10.51	9.91	9.41	11.01
BURL1	28.9N	089.4W	592	23	1024.5102	161		1012.1112	081		1017.51	536	1	30105	191	140	4.11	7.11	7.51	9.71	7.61	7.51	7.21	6.31	07.71
BUZM1	41.4N	071.0W	699	29	1027.5125	041		1005.6112	111		1017.31														
CAPS1	43.2N	124.4W	739	31	1026.6110	151		1012.0129	251		1018.61	713	1	23113	171	010	8.61	7.01	1.61	1.91	9.51	6.51	1966	3.11	07.11
CHLH2	38.0N	075.7W	737	13	1027.9102	171		1009.3110	231		1019.91	731	1	26101	171	040	9.81	10.81	7.11	8.91	13.41	11.91	8.81	4.71	11.81
CLKW1	34.6N	076.5W	739	31	1027.2125	161		1011.1109	231		1017.21	732	1	28112	011	290	10.21	8.01	5.91	7.01	10.21	10.01	8.01	9.21	09.61
CTGF1	29.7N	086.4W	739	31	1025.8102	121		1011.3102	221		1017.41	732	1	24106	171	220	1.81	1.81	3.01	4.01	5.11	6.31	6.21	3.31	04.91
DESL1	42.4N	070.6W	744	31	1025.7117	161		1006.9102	241		1016.41	727	1	24131	221	020	8.61	7.01	4.71	6.01	5.11	10.71	8.71	8.51	07.61
DESS1	41.7N	124.5W	740	31	1025.5121	021		1009.5104	161		1018.41	713	1	23104	221	020	2.61	2.81	3.01	3.01	3.61	5.61	5.41	5.41	08.11
DTSN3	47.1N	090.7W	744	31	1024.8130	161		1001.4104	161		1013.41	737	1	30114	201	290	7.41	7.01	5.91	5.41	6.71	9.51	10.11	7.31	08.11
DTLN3	47.2N	091.1W										730	1	31111	091	300	12.61	11.21	13.31	7.21	12.41	14.71	9.91	8.61	12.91
FSTF1	32.7N	079.7W	743	31	1027.7119	151		1011.6105	031		1018.01	733	1	23125	011	310	3.61	3.61	3.61	4.01	5.61	9.91	10.31	4.61	08.51
FPIA2	27.3N	113.6W	738	31	1031.3101	231		1008.4105	031		1020.61	692	1	21105	061	150	4.71	2.61	1.11	0.51	6.11	2.61	2.61	2.61	04.51
FPSN7	33.6N	077.6W	734	06	1023.6131	161		1020.4104	231		1021.81	719	1	24106	101	300	10.41	3.61	5.51	5.71	10.21	11.61	10.91	4.91	10.51
GDIL1	29.3N	089.9W	578	26	1025.5102	171		1011.1103	231		1016.91	577	1	18127	211	340	7.61	5.21	5.41	5.41	5.41	5.61	5.61	4.91	05.61
GLLN6	43.9N	076.4W	743	31	1029.7101	121		1004.5102	071		1016.21	735	1	28127	161	260	3.11	6.21	5.21	7.71	9.91	8.61	12.41	5.61	09.41
IOSN1	41.9N	087.0W	740	31	1029.7101	121		1004.5102	291		1015.41	736	1	28126	161	260	3.11	6.21	5.21	7.71	12.71	14.21	11.41	9.61	11.91
LKWF1	26.6N	080.0W	349	15	1021.3125	171		1007.3103	271		1017.11	348	1	37123	203	180	1.31	7.21	6.61	8.11	10.61	9.01	3.91	3.01	08.01
MDRM1	44.0N	067.3W	743	31	1025.6101	121		1003.4102	231		1018.61	741	1	35126	231	180	8.21	8.31	7.81	9.61	14.11	13.01	9.91	7.91	12.21
MISM1	45.8N	084.7W	743	31	1026.2101	241		1006.4102	231		1016.61	738	1	27126	071	280	2.11	3.61	2.51	4.21	15.11	13.61	8.61	4.21	08.01
NWPO3	48.6N	124.1W	739	31	1024.5110	161		1010.0129	031		1018.41	604	1	24113	081	350	11.31	2.01	2.61	2.31	4.11	6.21	3.31	6.11	07.71
PILN6	48.2N	124.6W	739	31	1024.4130	161		1001.3104	231		1012.91	731	1	31121	161	280	5.91	6.91	6.51	9.41	9.01	11.51	11.21	6.31	09.51
PTAC1	47.2N	127.7W	654	31	1022.4102	201		1008.2115	041		1014.81	582	1	29124	011	190	11.61	9.51	8.31	11.71	9.61	11.51	14.21	12.01	07.31
PTAT2	27.8N	097.1W	737	31	1027.5106	161		1008.5173	231		1016.91	736	1	28104	131	200	6.61	8.21	9.51	11.21	10.21	7.61	5.01	5.31	10.51
PTGC1	29.4N	120.7W	736	31	1019.7102	191		1010.8114	011		1014.61	623	1	31113	011	350	16.21	2.91		7.31	9.61	3.81	0.31	6.81	13.61
RCAN1	47.9N	069.3W	744	31	1024.5130	161		1001.4104	231		1013.01	733	1	31106	161	260	5.81	11.11	9.81	11.11	9.61	10.71	11.01	10.61	10.61
SBIO1	41.7N	082.0W	275	14	1028.5146	211		1007.2110	101		1015.41	657	1	24116	031	320	8.01	3.61	4.01	4.61	9.91	9.81	9.91	10.01	07.91
SDHN1	43.4N	070.7W	742	31	1023.4130	161		999.1105	091		1014.31	694	1	27105	031	090	8.21	9.61	7.11	6.21	10.01	6.31	7.91	8.51	08.21
SISW1	48.3N	122.9W	740	31	1026.7101	241		1006.2102	231		1018.01	738	1	27124	071	280	2.11	3.61	2.51	5.11	9.61	8.61	6.61	4.21	08.01
SJLF1	30.4N	081.4W	739	31	1022.6107	051		1010.5174	201		1017.71	737	1	21122	231	160	8.51	8.41	7.31	9.21	7.51	6.81	6.91	4.61	06.71
SMKF1	24.7N	084.1W	739	31	1023.4108	161		1011.4105	231		1016.91	732	1	20108	011	160	4.31	4.81	7.51	9.61	10.51	11.31	5.51	3.51	09.41
STDM4	45.2N	064.1W	738	31	1026.8130	161		1003.1175	091		1014.81	732	1	29124	011	190	11.61	9.51	8.31	11.71	9.61	11.51	14.21	12.01	07.31
SVLS1	32.0N	064.7W	744	31	1021.9107	151		1003.1175	011		1017.51	742	1	42125	001	070	8.51	12.71	14.21	9.91	12.11	11.61	8.91	6.91	11.41
TTIN3	48.6N	124.7W	739	31	1026.6101	021		1008.7106	011		1019.01	734	1	26130	031	190	4.71	5.91	9.01	3.81	10.91	7.81	6.71	2.31	08.91
WPOW1	47.7N	122.4W	739	31	1024.7101	131		1005.9170	011		1016.31	710	1	17101	201	010	5.01	5.21	2.21	4.41	6.91	8.01	1.01	1.81	09.61

JULY 1985

TOTAL FREQUENCY OF WIND SPEEDS (%)

BUOY	LAT	LONG	CALM	<4KT	4-10KT	11-21KT	22-33KT	34-47KT	>47KT
41001	34.9N	072.9W		9.8	57.2	33.7			
41002	32.3N	075.5W		5.3	52.9	41.6	0.1		
41006	29.3N	077.3W		7.4	72.7	19.2	0.7		
42001	25.9W	089.7W		17.4	66.8	15.6	0.1		
42002	26.0N	093.5W		3.3	31.6	63.2	1.9		
42003	26.0N	085.9W		15.6	55.4	28.7	0.3		
42007	30.1N	088.9W		13.7	64.8	21.5			
44004	38.5N	070.7W		3.9	26.5	62.8	6.8		
44005	42.7N	068.9W		11.5	62.4	26.1			
44007	43.5N	070.1W	3.6	7.0	55.6	34.4	1.1		
44008	40.5N	069.5W	3.8	11.1	54.3	30.5			
44009	38.5N	074.6W	4.7	7.7	55.3	34.9	0.1		
44011	41.1N	066.6W		12.4	72.4	14.9	0.3		
44012	38.8N	074.6W	4.5	8.7	58.6	28.8	0.9		
44013	42.4N	070.6W	4.1	14.5	65.7	15.8			
45001	48.0N	087.6W	11.5	50.0	50.0				
45002	45.3N	086.3W	4.6	13.3	63.5	23.1	0.1		
45003	45.3N	082.8W		11.4	62.9	25.7			
45004	47.2N	086.5W		14.7	71.2	14.1			
45005	41.7N	082.4W		9.6	68.2	22.2			
45006	47.3N	090.0W	10.6	21.8	74.4	4.2			
45007	42.7N	087.1W	5.9	15.6	61.2	23.0	0.1		
45008	44.3N	082.4W	4.3	13.2	61.8	24.8	0.1		
46001	56.3N	148.3W		4.7	42.5	50.1	0.7		
46002	42.5N	130.3W		3.5	29.5	66.4	0.5		
46003	51.9N	155.7W		7.8	46.0	46.5	0.7		
46004	50.9N	135.9W		6.4	52.6	29.0			
46005	46.1N	131.0W		2.0	37.8	56.9	3.4		
46006	40.8N	137.4W		1.4	21.7	69.1	7.9		
46010	46.2N	124.2W		9.8	53.8	36.4			
46011	34.9N	120.9W		11.2	39.6	49.3			
46012	37.4N	122.7W		14.3	58.2	27.6			
46013	38.2N	123.3W		18.3	35.7	45.0	1.0		
46014	39.2N	124.0W		13.4	49.4	36.3	0.8		
46016	63.3N	170.3W		2.5	47.3	47.3	2.9		
46017	60.3N	172.3W		7.9	62.2	28.2	1.7		
46022	40.8N	124.5W		16.4	55.8	27.1	0.7		
46023	34.3N	120.7W		6.7	22.8	59.5	11.1		
46024	32.8N	119.5W		13.5	37.6	47.9	1.0		
46025	33.6N	119.0W		24.6	47.1	8.3			
46026	37.8N	122.7W		7.0	60.4	32.3	0.3		
46027	41.8N	124.4W	17.6	28.1	45.4	11.6	12.7	2.1	
46028	35.8N	121.9W		10.6	25.9	46.1	17.4		
46030	40.4N	124.5W	7.7	13.8	44.2	41.0	1.0		
46031	55.5N	161.7W		8.1	49.7	41.5	0.7		
46032	54.2N	165.8W		8.4	63.6	31.6	4.5		
46034	55.1N	163.1W			46.4	41.5	11.7	0.4	
51001	23.4N	162.3W		0.3	17.9	61.7	0.1		
51003	19.2N	160.8W		0.3	9.6	55.1			
51004	17.5N	152.5W		0.1	7.0	90.6	2.3		
ALRF1	25.0N	080.6W	5.3	11.0	55.2	71.1	2.7		
ALSN6	40.5N	073.8W	1.9	8.9	40.8	44.7	3.3	0.3	
BURL1	28.9N	089.4W	4.1	17.4	61.0	19.2	2.4		
CAPC1	41.1N	070.0W	4.7	21.6	58.2	15.2	0.1		
CHLV2	36.9N	075.7W	2.6	6.0	36.7	53.2	4.1		
CLKN7	34.6N	076.5W	2.4	7.7	48.7	43.4	0.1		
CSBF1	29.7N	085.4W	10.4	36.3	38.4	7.1	0.1		
DBLN6	42.5N	079.4W	3.9	15.3	60.0	20.6	0.1		
DESW1	47.7N	124.5W	6.7	7.5	53.5	25.4	1.8		
DISW3	47.1N	090.7W	3.9	15.7	55.1	29.0	0.1		
DSLN7	35.2N	075.3W	2.3	9.1	26.6	59.9	3.5		
FBIS1	32.7N	079.9W	2.0	14.1	54.4	29.7	1.1	0.7	
FFIA2	57.3N	133.6W	33.3	9.8	48.2	8.1			
FPSN7	33.5N	077.6W	4.7	8.8	41.9	47.0	2.3		
GDIL1	29.3N	089.9W	5.5	24.6	49.3	6.1			
GLLN6	43.9N	076.4W	4.6	19.5	49.3	27.6	1.6		
IOSN3	43.0N	070.6W	1.9	7.0	33.3	56.0	1.8	0.1	
LKWF1	26.6N	080.0W	2.0	17.8	59.5	20.7	1.7	0.3	
MDRM1	44.0N	068.1W	1.1	3.5	32.4	60.7	3.2	0.1	
MISM1	43.8N	068.9W		3.0	34.6	55.8	6.9	0.3	
NWPO3	48.6N	124.1W	19.4	22.7	48.7	9.3	0.3		
PILM1	48.2N	088.4W	2.3	12.7	47.5	36.4	1.4		
PTAC1	39.0N	123.7W	10.1	19.6	55.5	14.9			
PTAT2	27.8N	097.1W	0.3	5.3	42.1	51.9	0.7		
PTGC1	34.6N	120.7W	4.7	12.8	24.3	42.1	20.8		
ROAM6	47.9N	089.3W	2.4	9.5	39.6	48.5	5.9		
SBIO1	41.7N	087.8W	4.0	18.4	54.6	26.2	0.8		
SGNW3	43.8N	087.7W	3.7	13.4	60.1	26.1	0.4		
SISW1	48.3N	122.9W	4.1	21.0	49.9	27.5	1.6		
SJKF1	30.4N	081.4W	4.1	20.6	62.3	17.1			
SRST2	29.7N	094.1W	4.1	11.1	44.0	44.9			
STDM4	47.2N	087.2W	1.7	6.1	31.1	53.5	10.3		
SVLS1	32.0N	080.7W	1.2	5.7	37.2	53.6	3.2	0.3	
TTIW1	48.4N	124.7W	5.9	15.8	48.4	28.7	2.2		
WPOW1	47.7W	122.4W	7.6	29.6	41.4	18.8			

TOTAL FREQUENCY OF WIND DIRECTIONS (%)

BUOY	N	NE	E	SE	S	SW	W	NW
41001	2.3	0.8	1.5	4.6	40.3	39.7	6.9	4.0
41002	0.4		0.2	9.5	38.4	41.6	7.9	2.1
41006	0.4	0.2	1.2	23.4	36.5	21.9	10.8	5.7
42001	7.9	13.8	24.0	21.5	11.4	3.7	6.8	10.8
42002	3.8	0.0	21.1	45.6	16.2	7.1	1.1	2.0
42003	10.8	11.7	23.6	15.8	9.4	7.8	8.8	12.0
42007	4.8	4.8	9.6	11.0	18.0	27.5	28.3	9.6
44004	8.5	9.3	5.0	5.8	26.4	26.9	14.7	3.3
44005	4.4	1.6	1.2	6.8	30.4	34.3	11.3	9.9
44007	5.9	2.6	1.6	2.3	22.6	42.4	11.3	11.3
44008	4.8	7.4	6.3	9.7	29.4	28.4	10.5	3.4
44009	9.0	13.8	6.0	9.2	20.1	16.8	3.3	2.0
44011	7.6	9.7	3.7	4.1	28.9	28.3	9.5	9.2
44012	5.9	12.7	7.7	9.3	42.0	14.3	4.9	2.2
44013	2.1	4.4	5.8	17.8	25.1	26.3	11.5	7.8
45001	6.7	9.6	17.3	18.4	33.8	1.9	13.4	3.8
45002	7.6	5.4	9.6	8.9	13.8	36.8	18.5	15.4
45003	4.4	4.1	2.1	2.5	27.8	16.8	12.5	30.6
45004	4.6	2.6	4.8	10.5	29.7	16.8	18.1	24.5
45005	5.8	12.9	12.3	11.9	19.0	20.3	11.1	6.5
45006	5.8	6.3	7.1	9.1	13.9	21.2	24.2	12.2
45007	12.8	12.5	9.3	9.7	23.1	17.4	9.9	5.3
45008	12.6	9.8	7.6	10.9	25.5	10.2	7.1	17.2
46001	1.2	3.5	16.5	19.2	17.7	17.5	19.8	5.4
46002	51.1	9.3	3.9	10.3	13.7	4.9	7.1	11.6
46003	4.8	2.3	3.7	10.2	26.5	29.2	19.8	13.1
46004	31.9	2.5	1.8	10.2	13.1	5.4	10.2	24.9
46005	8.0	0.9	0.3	0.5	31.4	31.9	16.7	10.9
46006	29.5	0.5	0.1	1.4	12.5	6.3	9.9	43.7
46010	6.1	1.2	0.9	0.8			3.4	85.4
46011	0.3	0.7	0.6	4.1	13.0	8.2	14.5	49.6
46012	2.9	0.5	0.8	6.9	4.5	3.7	14.2	67.5
46013	32.1	2.5	1.5	3.1	12.1	3.5	3.1	42.1
46014	1.3	20.2	6.6	7.0	7.2	30.6	18.5	2.6
46016	21.5	8.3	3.3	11.3	10.5	29.5	3.7	4.0
46017	50.7	4.6	2.0	0.6	10.1	6.0	3.5	20.1
46022	8.3	1.2	1.8	1.0	1.5	1.1	3.2	82.0
46023	1.2	2.3	2.3	5.7	2.9	3.8	21.5	60.3
46024	3.7	1.8	4.6	10.5	9.5	12.4	46.8	8.8
46025	0.1	0.5		0.7	13.3	10.8	51.2	15.6
46026	24.2	4.1	3.0	11.9	20.0	5.3	5.2	26.3
46027	7.9	1.2	0.6	2.5	1.0	0.6	1.4	84.9
46028	58.4	2.3	1.0	6.7	11.4	5.0	3.5	11.8
46030	23.8	19.6	5.0	6.3	30.8	11.9	1.3	7.1
46031	9.7	3.6	16.8	21.9	5.9	1.9	6.8	33.4
46032	28.9	5.7	4.6	30.1	3.6	1.4	4.6	21.1
46034	0.8	49.6	46.8	0.8				
51001		40.9	38.7	0.4				
51003		60.9	38.7	0.4				
51004	1.4	11.7	44.7	18.3	14.1	6.3	0.6	2.7
ALRF1	3.1	5.1	6.8	8.8	19.6	34.0	14.4	14.1
ALSN6	5.8	3.8	3.4	15.0	21.5	25.1	20.8	5.3
BURL1	26.8	42.9	4.6	2.4	4.8	15.8	0.9	0.6
CAPC1	4.6	16.1	4.3	9.3	27.2	28.7	7.0	3.9
CHLV2	3.6	6.7	3.6	3.9	19.7	51.1	8.3	3.0
CLKN7	2.8	9.6	7.1	6.9	8.5	24.9	24.6	5.8
CSBF1	2.8	9.4	2.9	17.8	19.6	29.3	12.0	6.4
DBLN6	6.1	7.8	2.9	7.2	13.3	2.4	4.5	53.3
DESW1	15.7	0.9	1.0	9.0	13.3	2.4	4.3	5.2
DISW3	3.3	11.4	7.8	8.3	12.6	38.8	13.3	9.2
DSLN7	6.7	3.6	1.4	1.9	10.6	51.5	12.6	9.8
FBIS1	3.3	3.9	3.4	5.7	16.9	47.6	13.6	6.3
FFIA2	24.2	11.8	5.9	14.8	19.3	10.6	9.2	5.2
FPSN7	4.1	5.9	3.2	5.9	30.7	40.7	7.3	2.3
GDIL1	3.8	1.9	2.9	7.2	20.1	29.5	19.8	14.8
GLLN6	2.7	3.6	2.4	7.2	29.5	19.8	26.8	8.7
IOSN3	2.9	1.8	1.7	12.3	36.3	21.9	14.1	8.7
LKWF1	9.8	8.9	9.9	44.8	24.4	13.6	3.8	2.6
MDRM1	1.5	2.8	1.7	2.5	36.1	33.5	16.6	6.3
MISM1	1.3	3.2	2.1	4.8	30.9	32.2	15.7	9.3
NWPO3	43.6	3.9	2.3	8.9	14.9	12.8	3.4	17.8
PILM1	4.7	5.6	4.8	12.1	18.8	26.8	21.5	5.6
PTAC1	50.7	7.1	0.8	3.9	21.1	6.4	1.4	8.6
PTAT2	4.5	3.9	2.3	6.9	14.9	12.8	3.4	46.8
PTGC1	7.3	6.8	2.7	10.6	13.2	19.1	25.5	12.8
ROAM6	5.0	11.3	15.8	13.7	11.9	16.1	13.8	13.1
SBIO1	10.0	8.4	9.7	12.6	29.3	11.5	13.6	5.8
SGNW3	8.2	8.9	1.8	3.6	29.5	29.5	8.6	7.3
SISW1	3.2	5.1	7.4	20.9	22.1	23.5	14.6	4.9
SJKF1	3.7	5.5	3.5	4.1	31.5	39.1	7.1	3.5
SRST2	13.5	3.8	3.2	10.1	32.6	7.3	20.6	18.9
STDM4	0.9	0.3	0.6	7.3	39.6	24.0	12.1	5.3
SVLS1	0.9	0.3	0.4	2.4	47.7	38.1	8.4	2.3
TTIW1	14.9	14.3	0.9	4.4	29.3	1.8	8.1	6.2
WPOW1	4.7W	122.4W	10.0					

JULY 1985

WAVE HEIGHTS (METERS)

BUOY	LAT	LONG	OBS	MAX	DY	HR	MEAN
41001	34.9N	072.9W	448	2.5	19	01	1.3
41006	29.3N	077.3W	598	3.5	24	18	1.0
42001	25.9N	089.7W	606	2.0	08	12	0.6
42002	26.0N	093.5W	283	1.5	02	01	0.9
42003	26.0N	085.9W	718	1.0	01	09	0.6
42007	30.1N	088.9W	294	1.0	05	20	0.5
44004	38.5N	070.7W	726	3.0	18	05	1.2
44005	42.7N	068.9W	733	3.0	27	00	1.0
44007	43.5N	070.1W	460	2.5	26	20	0.7
44008	40.5N	069.5W	744	2.5	27	05	1.0
44011	41.1N	066.6W	735	4.0	18	11	1.2
45003	45.3N	082.8W	484	2.5	22	11	0.8
45004	47.2W	086.5W	744	1.5	25	02	0.5
45005	41.7N	082.4W	379	1.5	08	12	0.6
45006	47.3N	090.0W	325	1.0	07	17	0.3
45007	42.7N	087.1W	449	2.0	31	17	0.6
45008	44.3N	082.4W	540	2.0	31	05	0.7
46001	56.3N	148.3W	740	3.5	31	21	1.3
46002	42.5N	130.3W	737	3.0	05	03	1.6
46003	51.9N	155.7W	732	5.0	31	17	1.5
46004	50.9N	135.9W	740	2.5	30	15	1.2
46005	46.1N	131.0W	710	3.5	31	11	1.3
46010	46.2N	124.2W	683	2.0	26	12	1.1
46011	34.9N	120.9W	273	2.0	23	05	1.1
46012	37.4N	122.7W	740	2.0	05	03	1.2
46013	38.2N	123.3W	721	3.0	14	03	1.4
46014	39.2N	124.0W	729	3.5	14	03	1.5
46022	40.8N	124.5W	736	3.5	14	01	1.6
46023	34.3N	120.7W	717	3.0	13	01	1.5
46024	32.8N	119.5W	726	3.0	04	09	1.4
46025	33.6N	119.0W	725	2.0	03	01	1.0
46026	37.8N	122.7W	751	2.0	14	10	1.0
46027	41.8N	124.4W	740	4.0	14	03	1.5
46028	35.8N	121.9W	738	3.0	04	23	1.7
51001	23.4N	162.3W	732	3.0	30	08	1.8
51002	17.2N	157.8W	740	4.0	26	14	2.1
51003	19.2N	160.8W	738	3.0	01	07	1.6
51004	17.5N	152.5W	736	5.0	25	16	2.0
CHLV2	36.9N	075.7W	733	2.0	01	05	0.7

FREQUENCY OF WAVE HEIGHTS (%)

BUOY	CLM	1-1.5M	2-2.5M	3-3.5M	4-4.5M	5-5.5M	6-7.5M	8-9.5M	10.5M
41001	8.0	77.4	14.5						
41006	16.3	78.5	3.3	1.6					
42001	37.1	16.6	0.1						
42002	17.1	82.8							
42003	71.8	28.1							
42007	95.9	4.0							
44004	6.6	80.7	6.5	0.1					
44005	20.4	74.3	5.1	0.2					
44007	41.3	56.9	1.7						
44008	16.8	78.0	5.1						
44011	10.2	75.3	12.9	1.3	0.1				
45003	70.2	27.8	2.0						
45004	11.9	88.0							
45005	74.4	25.5							
45006	61.2	0.9							38.7
45007	29.8	68.8	1.3						
45008	43.1	55.7	1.1						
46001	10.2	46.8	22.8	0.8					
46002	41.0	53.7	2.8						
46003	5.7	60.1	28.6	3.6	1.7				
46004	50.9	48.5	7.2						
46005	14.3	76.6	11.4	2.3					
46010	46.2	83.0	9.2						
46011	34.9	97.8	2.1						
46012	37.4	94.8	3.4						
46013	38.2	72.6	20.7	0.5					
46014	39.2	45.8	40.3	11.6					
46022	40.8	61.2	18.2	10.6					
46023	34.3	76.1	23.9	1.3					
46024	32.8	68.4	29.8	1.8					
46025	33.6	79.5	5.5						
46026	37.8	89.3	8.4						
46027	41.8	56.2	26.4	7.7	0.1				
46028	35.8	48.6	48.0	1.2					
51001	23.4	29.2	70.3	0.4					
51002	17.2	11.4	80.9	6.8	0.6				
51003	19.2	36.8	61.5	1.6					
51004	17.5	18.6	75.5	3.5	2.3				
CHLV2	36.9	18.7	3.4						

AUGUST 1985			AIR TEMPERATURE (DEG C)								SEA TEMPERATURE (DEG C)								AIR-SEA TEMPERATURE DIFFERENCE (DEG C)							
BUOY	LAT	LONG	OBS	DAYS	MAX	DY HR	MIN	DY HR	MEAN	OBS	DAYS	MAX	DY HR	MIN	DY HR	MEAN	OBS	DAYS	MAX	DY HR	MIN	DY HR	MEAN	
41001	34.9N	072.9W								743	31	28.4101	161	26.0111	121	26.61										
41002	32.3N	075.3W	433	26	1026.9127	161	1011.3110	211	1019.91	421	26	29.4128	211	27.8104	091	28.41										
41004	29.3N	077.3W	723	31	1025.8127	181	1012.7110	081	1017.71	687	31	23122	101	250		7.61	7.91	9.41	6.81	8.61	8.41	5.01	08.21			
42001	25.9N	089.7W	740	31	1019.5127	041	1004.2114	201	1015.11	705	31	24114	191	130		6.11	7.01	9.01	11.21	10.11	5.51	6.21	9.21	08.41		
42002	26.0N	093.5W	648	26	1019.6127	191	1007.2115	201	1014.41	719	31	24127	021	130		6.51	8.61	10.01	9.41	8.21	6.91	6.21	9.01	09.01		
42003	26.0N	085.9W	559	25	1016.2105	161	1012.3112	091	1015.71	552	31	29114	131	150		6.21	5.21	11.01	11.61	6.01	5.61	6.71	7.31	08.01		
42007	30.1N	088.9W	597	26	1024.2127	151	1011.0121	301	1016.31	581	31	22126	161	170		6.51	11.01	11.61	8.81	7.91	6.61	6.71	7.01	08.81		
42040	26.5N	093.7W	740	31	1024.9105	141	1008.3101	091	1016.11	719	31	24120	071	200		13.01	14.11	12.51	10.11	15.51	14.71	17.01	12.41	14.01		
44005	42.7N	068.4W	743	31	1025.6105	151	1001.3101	161	1018.11	737	31	26101	191	350		10.51	6.41	11.61	11.21	7.71	7.11	7.01	7.31	08.21		
44007	43.5N	070.1W	744	31	1024.5126	141	1006.6116	011	1017.81	729	31	27131	071	050		10.61	10.91	11.81	7.71	7.81	7.81	5.41	7.01	08.21		
44008	40.5N	069.5W	712	10	1025.7105	131	1005.2101	121	1018.51	691	31	23119	101	090		8.71	7.51	6.61	5.91	7.41	10.41	10.11	7.01	07.91		
44009	38.5N	074.6W	743	31	1025.4106	151	1009.2110	231	1016.41	726	31	24114	141	270		9.11	8.51	9.31	11.41	9.61	9.41	7.31	9.01	09.41		
44011	41.1N	066.6W	744	31	1026.6126	141	1003.6101	171	1019.51	752	31	22101	191	250		9.91	7.71	6.01	6.21	8.01	8.81	7.51	7.01	07.91		
44012	38.6N	074.6W	726	31	1025.8105	171	1008.7101	071	1016.51	719	31	21101	011	180		8.71	9.21	8.91	7.41	11.91	8.61	8.21	7.81	09.41		
44013	42.4N	070.8W	742	31	1025.1103	181	1003.1101	081	1018.01	737	31	26106	041	190		9.81	6.81	6.01	9.31	7.21	7.61	7.01	7.41	08.11		
45001	48.0N	087.6W	741	31	1024.7101	161	1002.7133	081	1016.11	726	31	25113	021	110		9.21	7.11	9.31	8.61	6.31	7.11	6.01	6.11	07.01		
45002	45.3N	066.7W	743	31	1026.6102	131	1006.3113	071	1017.51	735	31	21113	071	210		9.31	10.31	10.21	6.41	8.81	9.31	9.81	7.61	09.11		
45003	45.3N	062.4W	739	31	1026.1102	131	1008.1107	071	1017.71	731	31	20106	061	190		9.01	8.01	10.01	8.61	8.41	9.21	5.01	7.61	07.71		
45004	47.2N	086.5W	737	31	1024.9102	131	1004.1113	081	1016.51	720	31	23110	121	290		5.61	7.71	8.11	8.41	7.01	6.51	7.71	7.21	07.41		
45005	41.7N	082.4W	737	31	1026.9128	121	1010.0125	011	1018.61	719	31	20101	021	050		7.61	9.61	7.91	6.51	9.21	8.31	8.61	7.21	08.41		
45006	47.3N	090.0W	742	31	1025.1101	171	1001.4110	231	1015.81	730	31	23112	191	270		3.51	7.41	6.81	7.41	8.01	8.41	5.41	5.41	07.01		
45007	42.7N	067.1W	619	27	1026.2102	141	1008.7124	221	1017.91	580	31	19112	121	140		7.41	7.01	6.61	10.21	8.21	8.01	8.41	8.01	08.11		
45008	44.3N	082.4W	742	31	1025.6102	151	1009.1107	071	1017.01	713	31	21106	051	170		7.11	7.61	7.31	9.71	7.41	8.51	6.21	6.21	07.81		
46001	56.3N	148.3W	742	31	1033.1112	081	997.5101	131	1017.71	739	31	27109	221	150		8.71	8.91	8.71	11.81	12.31	14.51	13.31	10.11	12.11		
46002	42.5N	130.5W	741	31	1033.1110	211	1010.6131	261	1021.61	740	31	30112	021	360		16.71	16.91	16.71	7.41	5.01	12.61	9.41	10.61	12.81		
46003	51.9N	155.7W	742	31	1033.1127	211	996.0101	001	1021.01	740	31	27109	191	210		9.81	13.31		12.11	17.41	16.41	13.71	13.01	14.91		
46004	50.9N	135.9W	741	31	1031.1111	201	1005.7106	131	1020.91	740	31	28102	231	200		11.41	6.01	7.71	9.61	13.41	13.21	10.31	12.71	12.01		
46005	46.1N	131.0W	740	31	1026.2110	201	1008.2110	281	1021.41	739	31	30115	101	350		12.31	8.81		9.41	12.61	11.61	10.81	10.61	15.61		
46006	40.8N	137.6W	244	11	1029.3121	211	1017.2130	131	1023.41	244		17123	161	030		8.51	9.61	7.31				9.91	9.91	8.71	09.31	
46010	46.2N	124.2W	739	31	1024.7102	191	1007.9117	021	1018.21	724		22130	131	170		8.51	6.61	2.81	4.71	9.81	6.91	9.81	8.11	07.91		
46011	39.9N	127.9W	721	31	1026.0119	181	1010.0116	231	1018.21	710		22125	141	310		8.61	7.41	2.31	1.51	3.61	9.11	8.61	11.01	09.51		
46012	57.4N	122.7W	742	31	1021.2127	191	1010.2116	121	1016.01	740		18102	051	330		7.61	1.31	2.91	4.91	7.01	4.41	2.21	9.51	08.31		
46013	38.2N	123.3W	741	31	1021.5127	181	1009.9116	111	1016.01	714		27107	021	320		6.21	2.21	2.21	5.01	2.01	2.81	3.61	13.61	11.61		
46014	39.2N	124.7W	166	07	1027.1101	221	1013.2106	101	1018.41	165		22105	061	320		11.51	3.01					10.01	14.61	13.01		
46016	63.3N	170.2W	237	11	1022.6116	151	991.4109	151	1010.91	237		17111	071	290		14.91	12.61	13.51	9.41	10.11	9.21	14.71	11.71	11.71		
46017	60.3N	172.3W	237	11	1024.3116	091	987.4131	181	1009.11	238		29127	161	170		8.51	11.41	11.51	12.01	13.11	9.71	9.81	12.81	10.81		
46022	40.8N	124.5W	741	31	1021.9127	191	1010.0116	131	1017.21	712		22110	121	350		10.31	4.61	3.61	4.31	4.91	7.91	6.11	7.51	08.51		
46023	34.3N	120.7W	736	31	1019.6113	201	1010.2116	161	1015.81	730		19125	111	300		5.91	5.11	4.41	4.91	4.31	6.61	5.11	10.21	09.41		
46024	32.8N	119.5W	742	31	1018.6113	201	1008.9125	021	1014.81	736		21125	021	300		5.91	3.11		1.01	1.01	3.31	7.61	12.31	11.01		
46025	33.8N	119.0W	741	31	1017.2127	181	1006.9125	021	1013.31	694		17101	031	280		2.01	2.61	3.01	3.21	2.91	4.31	7.11	5.51	05.61		
46026	37.8N	122.7W	741	31	1020.3127	181	1010.0116	121	1016.51	732		21107	071	290				2.81	5.41	8.21	10.01	10.21	10.91	09.41		
46027	41.8N	124.4W	161	07	1023.0102	051	1016.0104	021	1019.21	150		25102	231	330		12.21	7.01		5.21	2.61	1.11	3.11	11.81	08.31		
46028	35.0N	121.9W	744	31	1019.0127	191	1009.2116	121	1014.91	735		28104	011	320		11.91		3.71	4.61	4.31	2.31	2.91	15.71	13.61		
46301	40.4N	124.5W	741	31	1021.3102	181	1009.9116	121	1017.01	568		31106	091	010		10.21	6.81	3.41	2.31	6.61	3.91	3.01	5.01	06.31		
46312	55.5N	161.7W	101	13	1021.5111	031	988.1109	181	1009.31	101		30101	091	350		16.11	5.61	4.91	2.81	2.61	17.51	14.61	8.91	13.51	14.31	
46321	56.2N	165.9W	128	16	1031.4115	211	988.8109	121	1011.71	126		35107	151	280		11.31	7.81	10.11	13.51	13.31	11.31	15.01	14.61	13.61		
51001	23.4N	162.1W	744	31	1026.7128	081	1011.1125	151	1017.31	738		21103	161	080		8.71	12.31	12.81	6.61	7.51	6.51	6.01	3.01	11.81		
51002	17.2N	157.8W	743	31	1017.5121	081	1006.2116	151	1012.01	575		27106	171	070		8.81	11.81	15.31	13.11				9.01	14.91		
51003	19.2N	160.5W	744	31	1018.6128	091	1012.6125	151	1015.51	744		18127	141	080		6.41	10.51	11.31	8.11	3.91	5.51			10.71		
51004	17.5N	152.5W	741	31	1016.9120	091	1010.5117	021	1013.51	741		25107	221	060		14.51	14.61	14.51	12.61					14.61		
51028	25.0N	153.9W	743	31	1022.0126	151	1012.6128	231	1017.41	730		26115	191	060		12.81	11.91	10.21	8.81	9.51	5.61	2.41	10.31			
ALSN6	43.5N	073.8W	743	31	1025.9105	131	1007.2130	231	1018.91	738		28109	001	220		11.61	6.71	10.71	9.31	13.41	9.21	8.81	10.41			
BURL1	28.9N	089.4W	560	24	1023.7127	151	1010.0115	091	1015.61	550		37115	081	100		13.91	12.01	12.61	12.31	8.71	8.71	8.31	10.41			
BUZM1	42.4N	071.0W	743	31	1024.9105	131	1008.5101	091	1016.71	721		28104	151	100		7.21	6.21	11.91	11.31	13.01	13.51	8.41	11.01	06.41		
CAR03	43.3N	126.4W	742	31	1028.4102	161	1010.5116	101	1018.91	689		19130	071	190		6.61	4.11	2.91	1.91	7.31	5.71	3.41	1.41	05.01		
CHLV2	36.9N	075.7W	585	25	1026.1128	031	1010.6171	081	1018.11	721		32116	221	230		8.31	12.41	7.31	8.91	13.11	11.91	8.51	6.41	10.61		
CLKV1	34.6N	076.9W	743	31	1026.8127	151	1010.2116	231	1018.21	730		30107	191	060		8.41	12.71	7.31	7.61	9.61	6.41	6.41	5.91	08.41		
CSBF1	29.7N	085.4W	730	31	1024.9127	031	1004.1131	151	1016.41	732		25131	071	040		6.81	9.81	8.51	8.31	6.61	6.41	5.91	5.91	06.01		
DRLN6	42.3N	079.4W	743	31	1026.8128	021	1010.4115	181	1017.81	720		23128	161	220		8.41	7.91	9.61	6.01	4.51	9.91	7.81	4.91	06.81		
DESW1	47.7N	124.5W	693	31	1026.3102	231	1009.2117	031	1017.91	674		24117	011	330		4.81	2.91	2.91	6.61	7.61	4.61	4.91	7.41	06.11		
DISW1	47.1N	089.7W	744	31	1027.0101	151	1000.4113	021	1013.91	741		30118	141	060		6.21	7.61	7.61	6.21	5.91	6.21	5.91	5.91	06.51		
DSLN7	35.2N	075.3W	532	23	1027.9127	151	1011.8110	231	1018.91	724		37119	101	230		12.81	13.01	8.91	6.81	13.21	10.01	8.91	7.61	11.61		
FBIS1	32.7N	079.9W	743	31	1027.9127	151	1011.9101	221	1018.91	727		23130	191	020		5.01	9.91	9.11	6.71	8.91	9.91	3.91	2.91	07.81		
FFIA1	27.9N	133.4W	740	31	1031.4112	091	1010.2101	271	1020.61	737		29101	161	060		9.91	7.81	7.41	12.61	11.41	10.61	11.41	11.41	10.41		
FPSN7	13.5N	077.6W	559	24	1027.8127	141	1010.6110	101	1018.81	721		30102	221	020		6.61	14.01	8.61	6.91	9.91	9.81	6.91	6.91	09.51		
GDIL1	29.3N	089.9W	698	28	1022.7127	161	1009.4115	091	1015.51	670		30115	101	150		8.31	9.71	9.91	7.81	7.31	5.31	6.11	5.21	07.51		
GLLN3	29.9N	076.4W	744	31	1029.6103	131	1009.4115	181	1018.11	742		31111	161	060		9.91	7.81	7.41	10.41	7.41	10.41	7.41	7.41	08.31		
IOSN3	43.0N	070.6W	743	31	1024.1103	131	1006.2101	101	1017.71	714		36131	081	020		13.71	11.61	11.81	11.21	11.91	9.71	8.91	6.91	10.81		
LSWF1	26.6N	080.0W	269	12	1027.9126	161	1012.0131	211	1018.11	742		26127	061	150		2.51	8.01	9.11	9.61	3.21	2.21	2.51	07.71			
MDRM1	43.0N	068.1W	744	31	1026.4125	161	1006.6116	071	1017.01	737		29131	171	060		13.01	10.41	13.01	10.61	11.01	11.01	11.41	11.41	11.41		
MISM1	43.8N	065.9W	742	31	1027.6125	141	1006.5101	121	1018.31	725		34131	161	030		11.51	10.61	13.61	10.21	11.91	10.31	10.01	9.61	11.41		
NWP03	48.6N	126.1W	744	31	1024.6102	191	1009.9116	131	1018.51	708		19103	221	340		7.41	1.31	2.71	1.41	7.01	4.91	2.11	5.11	05.91		
PILN3	48.2N	088.4W	741	31	1025.7128	151	1001.6113	051	1015.51	727		36113	011	090		5.01	10.11	13.61	9.41	9.51	12.61	9.91	7.61	10.41		
PTAC1	39.0N	123.7W	441	20	1021.1127	171	1013.7124	121	1016.91	570		22108	051	350		8.11	3.81	1.91	3.11	6.01	4.01	1.11	8.21	07.71		
PTAT2	27.8N	097.1W	745	31	1019.0127	161	1007.8115	221	1014.11	722		22128	211	080		10.31	10.21	9.71	9.91	9.01	9.11	2.11	4.01	09.51		
PTGC1	34.6N	120.7W	727	31	1019.2118	191	1009.8116	091	1015.41	365		27106	031	350		13.61	6.31		3.51	6.51	2.71	2.51	8.11	11.61		
RDAN1	47.9N	089.3W	744	31	1025.8101	171	1001.2113	091	1015.41	719		37112	211	100		9.01	10.41	12.31	13.71	12.51	13.71	13.41	9.91	12.21		
SRI01	41.7N	082.8W	513	22	1026.9128	121	1009.2126	221	1018.41	730		22119	031	330		5.01	9.21	4.51	6.21	9.21	8.51	8.91	9.91	07.01		
SGNW3	43.8N	087.7W	742	31	1026.2102	141	1007.8106	001	1017.01	702		21112	131	140		7.31	6.61	5.21	9.21	9.11	6.31	8.41	8.51	07.91		
SISW1	48.3N	122.9W	744	31	1023.3102	191	1008.5117	031	1017.31	744		22101	121	240		2.91	2.11	3.11	4.01	4.71	7.61	7.51	5.11	06.61		
SJLF1	30.4N	081.4W	743	31	1025.9127	161	1010.7131	201	1017.61	742		33131	201	090		7.01	13.51	12.21	10.61	7.31	9.41	4.71	4.71	09.21		
SRST2	29.7N	094.1W	741	31	1021.4127	161	1006.0115	211	1015.81	734		24127	231	130		4.91	6.11	11.01	8.91	9.71	11.21	5.61	9.01	08.61		
STGN1	47.2N	087.7W	739	31	1027.0101	161	1004.8113	071	1016.91	730		32113	061	170		8.11	9.31	13.01	10.51	14.71	11.31	11.61	11.01	12.81		
SVLS1	32.0N	064.9W	744	31	1026.9127	151	1011.9101	221	1018.41	736		32125	201	220		10.11	15.91	11.11	10.81	12.11	11.81	10.21	8.01	11.71		
TTIA1	48.6N	124.7W	744	31	1024.9102	231	1010.4117	061	1018.61	738		23113	161	070		3.31	4.91	7.41	7.51	7.81	5.91	4.61	2.51	06.41		
WPOW1	47.7N	122.4W	740	31	1023.4102	161	1008.1117	011	1017.21	722		19107	221	190		4.71	4.81	1.41	4.81	7.41	4.81	1.91	1.51	05.51		

AUGUST 1985

TOTAL FREQUENCY OF WIND SPEEDS (%)

BUOY#	LAT	LONG	CALM	<6KT	6-10KT	11-21KT	22-33KT	34-47KT	>47KT
41001	34.9N	072.9W		7.8	52.0	37.7	2.6		
41002	32.3N	075.3W		10.5	39.4	48.5	1.7		
41004	29.3N	077.7W		11.4	59.3	29.4	0.1		
42001	25.9N	089.7W		19.3	53.7	19.6	4.4	1.0	
42002	26.0N	093.5W		9.3	62.3	28.7	0.6		
42003	26.0N	085.9W		18.7	49.6	18.7	3.3		
42007	30.1N	088.9W		11.9	56.6	30.8	0.5		
44004	38.5N	070.7W		4.3	21.2	60.9	13.6		
44005	42.7N	068.9W		6.5	71.4	20.8	1.4		
44007	43.5N	070.1W	8.8	10.7	63.9	23.7	2.1		
44008	40.5N	069.5W	4.1	14.8	58.4	20.8	0.3		
44009	38.5N	074.6W	7.6	4.0	56.8	32.7	0.4		
44011	41.1N	066.6W		16.1	57.4	26.4	0.1		
44012	38.8N	074.4W	4.5	8.8	52.6	33.8			
44013	42.4N	070.8W	4.6	10.8	68.6	15.6	0.3		
45001	48.0N	087.6W	6.2	15.4	47.5	16.4	0.7		
45002	45.3N	086.4W	4.9	10.1	53.8	31.0			
45003	45.3N	082.8W		17.1	58.7	24.3			
45004	47.2N	086.5W		14.4	64.6	20.7	0.3		
45005	41.7N	082.4W		6.7	69.0	24.3			
45006	47.3N	090.0W	12.7	22.9	58.2	21.9			
45007	42.7N	087.1W	3.3	9.8	62.6	27.6			
45008	44.3N	082.4W	6.0	12.5	62.4	25.1			
46011	34.9N	120.9W		3.8	34.2	61.2	1.0		
46022	42.8N	124.5W		1.1	35.9	62.9	0.1		
46023	51.9N	155.7W		0.4	22.3	70.4	6.9		
46034	50.9N	135.9W		2.2	31.6	66.2			
46035	44.1N	131.7W		1.9	10.3	60.3	19.5		
46036	40.8N	137.4W		4.5	59.0	36.5			
46303	46.2N	126.2W		9.9	67.4	22.7	0.4		
46011	34.9N	120.9W		17.1	35.1	47.5	0.3		
46012	37.4N	122.7W		12.2	57.6	30.8			
46013	38.2N	123.3W		13.2	33.2	43.4	10.2		
46014	39.2N	124.0W		9.5	16.4	74.4	1.8		
46016	63.3N	179.3W		0.8	48.9	49.7	4.6		
46017	60.3N	172.5W	0.4	7.6	48.1	42.0	2.3		
46022	40.8N	124.5W		19.7	52.4	22.7	0.1		
46023	34.3N	120.7W		9.1	23.7	67.4	0.8		
46024	32.8N	119.5W		9.9	41.7	53.4			
46025	33.6N	119.0W		28.2	64.5	7.3			
46026	37.8N	122.7W		8.7	53.7	37.6			
46027	41.8N	124.4W	18.0	23.3	47.3	29.7	0.7		
46028	35.8N	121.9W		7.8	21.4	62.2	8.7		
46030	40.4N	124.5W	7.7	18.2	49.8	24.0			
46031	55.5N	161.7W		6.9	28.7	47.8	16.8		
46032	54.2N	165.7W			41.4	46.9	10.9	0.8	
51001	23.4N	162.2W		3.3	29.4	67.3			
51002	17.2N	157.7W		0.2	16.7	71.0	2.1		
51003	19.2N	160.8W		1.7	43.0	55.2			
51004	17.5N	152.5W			7.4	91.8	0.8		
ALRF1	25.0N	080.4W	4.9	13.5	41.4	40.8	3.2	0.8	
ALSN6	40.5N	073.6W	3.0	11.2	38.8	46.6	3.4		
BURL1	28.9N	089.4W	6.5	19.1	54.5	19.7	0.5	0.2	
BUZM3	41.4W	071.0W	1.6	6.5	47.0	40.8	3.6		
CAMB3	43.3N	124.4W	16.4	39.2	44.3	12.5			
CHLV2	36.9N	075.7W	2.8	8.2	40.6	47.1	2.1		
CLKN1	34.6N	076.5W	2.2	9.2	58.8	31.3	0.7		
CSBF1	29.7N	085.4W	0.6	24.0	68.3	10.0	0.7		
DBLN6	42.5N	079.4W	4.0	21.3	61.1	17.2	0.3		
DPIA1	47.7N	124.5W	10.5	35.0	47.3	17.2	0.4		
DISA1	47.1W	092.7W	5.3	18.2	42.8	32.8	7.1		
DSLN1	35.2N	075.7W	3.3	11.5	36.3	48.3	0.6	0.3	
FRISI	32.7N	079.9W	2.8	14.6	61.3	21.1	0.1		
FFIA2I	57.3N	133.6W	27.5	32.4	38.6	1.4	0.1		
FPSN7I	33.5N	077.9W	7.5	12.8	50.2	33.6	3.5		
GDILI	29.3N	089.9W	7.5	25.6	57.2	9.4	0.3		
GLLN6I	43.9N	076.4W	2.7	14.0	52.3	31.6	2.4		
IOSN3I	43.0N	070.6W	3.1	8.4	43.1	44.4	3.8	0.3	
LKAF1I	26.6N	080.0W	5.1	22.6	50.0	20.8	0.5		
MDRN1I	44.0N	068.1W	0.7	4.4	43.5	47.2	3.8	1.0	
MISM1I	43.8N	068.9W		4.6	41.5	50.1	3.7	0.1	
NAPO3I	44.6N	124.1W	19.4	38.3	43.4	18.4			
PILM4I	48.2N	088.4W	1.9	10.5	46.4	37.4	3.8		
PTAC1I	39.0N	123.7W	7.5	17.2	53.4	21.8	0.2	0.0	
PTAI2I	27.8N	097.1W	1.0	7.1	53.2	39.6	0.1		
PTGC1I	34.6N	120.7W	3.3	14.0	32.8	48.8	7.7		
POAM4I	47.9W	089.3W	2.9	7.9	57.6	31.6	0.0		
SRIO1I	41.7N	082.8W	3.6	20.7	60.4	15.8	0.1	0.3	
SPMW3I	43.8N	087.7W	5.3	19.7	51.7	23.6			
SISW1I	48.3N	122.9W	7.3	28.1	49.5	12.3	0.1		
SJLF1I	30.4N	081.4W	3.1	11.3	51.2	34.4	3.1		
SRST2I	29.7N	094.1W	1.1	12.1	51.8	35.0	0.0		
STDM4I	47.2N	087.7W	1.7	6.5	32.1	51.4	10.0		
SVLS1I	32.0N	080.7W	0.5	3.0	42.9	48.2	5.4		
TTIW1I	48.4N	124.7W	11.2	28.5	54.1	6.2	0.1		
WPOA1I	47.7N	122.4W	9.7	33.2	55.3	11.5			

TOTAL FREQUENCY OF WIND DIRECTIONS (%)

BUOY#	LAT	LONG	N	NE	E	SE	S	SW	W	NW
41001	34.9N	072.9W		7.8	52.0	37.7	2.6			
41002	32.3N	075.3W	12.2	19.6	5.9	10.8	23.2	28.3	7.6	4.1
41004	29.3N	077.7W	2.8	4.5	10.1	11.1	35.4	29.1	4.3	3.0
42001	25.9N	089.7W	1.7	4.1	29.3	15.4	23.7	21.1	0.6	2.9
42002	26.0N	093.5W	10.5	9.8	22.4	16.8	10.4	4.1	10.2	11.7
42003	26.0N	085.9W	8.8	7.1	10.4	20.6	22.3	19.7	8.3	4.6
42007	30.1N	088.9W	11.9	11.9	15.9	18.9	6.8	15.7	13.8	12.1
44004	38.5N	070.7W	8.7	12.4	21.3	19.7	12.8	13.0	7.1	9.8
44005	42.7N	068.9W	11.1	24.2	13.9	4.6	19.2	14.4	6.2	7.6
44007	43.5N	070.1W	10.7	23.7	2.5	4.1	10.2	16.8	20.7	11.4
44008	40.5N	069.5W	10.6	8.1	5.8	5.0	19.1	24.2	12.0	15.3
44009	38.5N	074.6W	11.8	11.9	15.4	10.5	14.8	16.0	9.6	9.8
44011	41.1N	066.6W	10.9	21.8	13.7	3.9	22.7	12.0	6.7	6.8
44012	38.8N	074.4W	10.9	11.0	6.3	7.9	12.4	16.4	15.2	15.8
44013	42.6N	070.8W	9.8	17.1	10.0	9.7	20.4	11.4	7.4	9.2
45001	48.0N	087.6W	8.6	6.0	6.1	28.4	16.7	28.5	9.4	10.4
45002	45.3N	086.4W	5.5	6.3	7.6	16.2	14.2	23.9	14.8	11.5
45003	45.3N	082.8W	8.8	8.1	5.2	20.8	9.2	35.7	13.3	8.9
45004	47.2N	086.5W	9.1	6.0	11.8	9.6	19.4	19.5	11.9	13.6
45005	41.7N	082.4W	7.9	6.4	8.8	15.2	18.1	12.6	13.9	17.7
45006	47.3N	090.0W	9.8	17.2	12.1	7.1	17.9	20.1	10.3	5.6
45007	42.7N	087.1W	9.2	13.9	13.9	6.4	12.1	19.8	16.5	8.1
45008	44.3N	082.4W	13.8	16.1	11.2	14.6	16.9	10.7	8.3	8.1
46011	34.9N	120.9W	14.8	11.7	13.8	9.8	16.7	10.4	13.1	10.5
46022	42.8N	124.5W	7.5	7.1	9.4	6.7	6.2	8.7	28.0	26.2
46023	51.9N	155.7W	48.2	8.1	0.2	1.3	7.7	24.2	18.1	7.2
46034	50.9N	135.9W	9.1	0.1		1.1	19.7	23.5	37.9	8.6
46035	44.1N	131.7W	5.2	1.8	1.7	4.6	7.9	18.0	19.8	42.6
46036	40.8N	137.4W	42.9	1.7		0.3	3.8	13.3	17.6	21.1
46303	46.2N	126.2W	19.1	42.8	1.3			8.7	18.9	28.1
46011	34.9N	120.9W	22.3	1.9	0.3	4.1	19.1	7.3	8.9	36.2
46012	37.4N	122.7W	32.2	1.9	0.5	1.3	1.8	1.1	5.1	74.0
46013	38.2N	123.3W	9.6	0.3	0.6	0.7	8.9	16.7	7.8	26.7
46014	39.2N	124.0W	3.7	0.6	1.4	0.7	11.1	3.9	5.0	68.9
46016	63.3N	179.3W	39.2	0.6					0.5	59.7
46017	60.3N	172.5W	3.8	13.8	6.1	12.7	10.8	20.8	19.1	12.8
46022	40.8N	124.5W	12.8	4.9	11.2	6.2	20.4	29.5	11.7	1.7
46023	34.3N	120.7W	59.6	8.8	0.2	4.7	9.8	5.6	2.9	12.5
46024	32.8N	119.5W	5.8		0.2	0.7	1.1	3.7	3.9	84.9
46025	33.6N	119.0W	1.9	0.6		4.0	0.1	1.9	21.0	74.9
46026	37.8N	122.7W	1.4	1.4	0.7	4.8	0.9	10.7	50.3	9.7
46027	41.8N	124.4W	18.0		0.1	1.3	10.3	9.9	34.2	26.2
46028	35.8N	121.9W	32.2	0.3		0.3	1.3	1.0	1.1	64.0
46030	40.4N	124.5W	5.3		1.8	0.4	4.8	1.1	5.1	74.0
46011	34.9N	120.9W	57.8	11.0	1.2	0.2	0.7	11.1	3.9	6.0
46012	37.4N	122.7W	22.5	0.3	0.5	1.3	1.0	1.1	5.1	66.9
46013	38.2N	123.3W	5.3		0.6	0.4	4.8	1.1	5.1	78.7
46014	39.2N	124.0W	3.7	0.6	1.4	0.7	11.1	3.9	5.0	68.9
46016	63.3N	179.3W	39.2	0.6					0.5	59.7
46017	60.3N	172.5W	3.8	13.8	6.1	12.7	10.8	20.8	19.1	12.8
46022	40.8N	124.5W	12.8	4.9	11.2	6.2	20.4	29.5	11.7	1.7
46023	34.3N	120.7W	59.6	8.8	0.2	4.7	9.8	5.6	2.9	12.5
46024	32.8N	119.5W	5.8		0.2	0.7	1.1	3.7	3.9	84.9
46025	33.6N	119.0W	1.9	0.6		4.0	0.1	1.9	21.0	74.9
46026	37.8N	122.7W	1.4	1.4	0.7	4.8	0.9	10.7	50.3	9.7
46027	41.8N	124.4W	18.0		0.1	1.3	10.3	9.9	34.2	26.2
46028	35.8N	121.9W	32.2	0.3		0.3	1.3	1.0	1.1	64.0
46030	40.4N	124.5W	5.3		1.8	0.4	4.8	1.1	5.1	74.0
46031	55.5N	161.7W	57.8	11.0	1.2	0.2	0.7	11.1	3.9	6.0
46032	54.2N	165.7W	22.5	0.3	0.5	1.3	1.0	1.1	5.1	66.9
51001	23.4N	162.2W	5.3		0.6	0.4	4.8	1.1	5.1	78.7
51002	17.2N	157.7W	0.8	2.6	6.5	5.3	9.0	5.3	19.7	27.5
51003	19.2N	160.8W	2.9	12.6	22.5	2.4		0.8	3.2	1.1
51004	17.5N	152.5W	0.1	21.9	67.1	10.0	1.1	0.8		
ALRF1	25.0N	080.4W	0.1	0.1	37.2	0.5				
ALSN6	40.5N	073.6W	1.0	4.4	44.2	30.7	6.5	3.9	3.0	1.0
BURL1	28.9N	089.4W	4.3	14.7	8.0	6.7	13.7	23.7	15.9	13.0
BUZM3	41.4W	071.0W	10.2	6.8	15.9	19.1	10.6	16.4	12.5	7.8
CAMB3	43.3N	124.4W	8.7	14.0	16.4	19.2	13.2	15.0	10.5	4.5
CHLV2	36.9N	075.7W	16.1	35.9	5.0	4.8	12.2	22.9	0.9	2.2
CLKN1	34.6N	076.5W	9.5	24.4	10.5	9.3	19.5	16.3	9.7	5.7
CSBF1	29.7N	085.4W	8.5	17.4	6.0	14.9	12.7	9.4	6.0	4.1
DBLN6	42.5N	079.4W	4.6	21.0	15.8	11.9	12.7	18.4	13.9	3.5
DPIA1	47.7N	124.5W	9.6	8.6	6.9	19.7	20.5	18.7	8.1	7.3
DSLN1	35.2N	075.7W	8.7	7.3	4.7	13.0	19.2	7.9	9.2	33.6
FRISI	32.7N	079.9W	10.2	18.4	15.9	10.3	10.5	20.4	8.7	4.8
FFIA2I	57.3N	133.6W	13.9	15.7	5.6	3.8	15.5	21.1	16.8	7.9
FPSN7I	33.5N	077.9W	8.1	11.3	19.7	19.1	14.3	16.8	7.0	3.8
GDILI	29.3N	089.9W	22.4	9.8	4.0	12.1	22.6	14.1	8.9	4.9
GLLN6I	43.9N	076.4W	11.0	15.6	10.7	9.4	19.9	19.6	8.3	5.6
IOSN3I	43.0N	070.6W	6.6	11.9	16.9	16.7	16.8	13.5	10.2	9.6
LKAF1I	26.6N	080.0W	6.9	16.3	4.9	11.5	19.5	13.4	20.7	6.8
MDRN1I	44.0N	068.1W	16.4	9.4	6.6	15.1	24.2	13.2	10.6	9.1
MISM1I	43.8N	068.9W	1.0	2.0	10.6	26.1	19.8	7.3	8.6	4.7
NAPO3I	44.6N	124.1W	7.6	9.1	6.2	5.6	16.0	27.0	16.2	6.7
PILM4I	48.2N	088.4W	7.0	7.7	9.9	5.1	10.1	25.0	16.0	10.8
PTAC1I	39.0N	123.7W	39.9	7.5	4.7	1.2	10.9	17.2	3.9	11.4
PTAI2I	27.8N	097.1W	3.2	6.9	13.1	10.9	18.7	20.9	18.1	7.9
PTGC1I	34.6N	120.7W	13.0	6.2	2.9	1.7	17.5	1.6	1.5	13.5
POAM4I	47.9W	089.3W	1.7	7.6	17.5	49.4	20.1	2.3	0.2	1.1
SRIO1I	41.7N	082.8W	70.4	2.3		0.7	6.4	4.5	2.2	9.2
SPMW3I	43.8N	087.7W	6.6	10.1	4.8	12.2	10.3	22.5	19.4	13.9
SISW1I	48.3N	122.9W	7.1	15.2	12.1	13.7	19.6	17.6	12.5	7.3
SJLF1I	30.4N	081.4W	12.4	9.8	6.1	13.2	21.4	13.7	16.2	7.8
SRST2I	29.7N	094.1W	1.8	1.8	2.0	2.7	10.7	22.7	47.5	10.6
STDM4I	47.2N	087.7W	1.0	13.1	20.9	24.2	11.5	16.9	9.9	2.5
SVLS1I	32.0N	080.7W	5.6	8.5	5.9	10.5	22.8	25.9	10.5	10.4
TTIW1I	48.4N	124.7W	15.7	9.4	9.4	14.5	20.6	9.6	16.5	11.9
WPOA1I	47.7N	122.4W	4.7	14.4	22.8	20.9	18.9	11.4	3.9	2.7
			1.2	10.3	10.0	2.7	40.2	22.6	3.9	9.2
			12.6	47.1	6.3	4.1	31.5	1.8	0.9	1.6

AUGUST 1985

WAVE HEIGHTS (METERS)

BUOY#	LAT	LONG	OBS	MAX	DY	HR	MEAN
41002	32.3N	075.3W	313	2.0	20	06	1.2
41004	29.3N	077.3W	711	2.5	03	20	1.2
42001	25.9N	089.7W	507	4.5	14	17	1.1
42002	26.0N	093.5W	498	2.5	14	23	0.8
42003	26.0N	085.9W	573	3.0	14	02	0.7
42007	30.1N	088.9W	312	3.5	30	11	0.8
44004	38.5N	070.7W	729	2.5	14	23	0.8
44005	42.7N	068.4W	774	4.5	31	21	0.9
44007	43.5N	070.1W	776	2.5	31	05	0.6
44008	40.5N	069.5W	711	2.5	01	19	0.9
44011	41.1N	066.6W	743	4.0	31	18	1.2
44012	38.8N	074.4W	444	3.0	13	05	0.8
44013	42.6N	070.8W	495	2.0	06	06	0.8
45001	48.0N	087.6W	400	2.0	16	20	0.7
45002	45.3N	086.4W	480	2.0	31	09	0.6
45003	45.3N	082.8W	405	2.0	13	02	0.8
45004	47.2N	086.5W	441	1.5	01	08	0.6
45005	41.7N	082.4W	501	2.0	06	06	0.7
45006	47.3N	090.0W	741	4.0	16	09	1.0
45007	42.7N	087.1W	441	1.5	01	08	0.6
45008	44.3N	082.4W	501	2.0	06	06	0.7
46011	34.3N	120.3W	741	4.0	16	09	1.0
46022	42.5N	130.3W	740	4.5	13	10	1.0
46023	51.9N	155.7W	742	5.0	16	02	1.1
46034	50.9N	135.9W	738	4.0	02	01	1.0
46035	46.1N	131.0W	707	4.0	12	16	1.0
46036	40.8N	137.6W	244	3.0	29	22	1.0
46010	46.2N	124.2W	725	3.0	10	13	1.0
46011	34.9N	120.9W	717	2.5	06	00	1.0
46012	37.4N	122.7W	739	2.5	05	06	1.0
46013	38.2N	123.3W	728	3.5	29	08	1.0
46014	39.2N	124.0W	186	3.5	04	06	1.0
46022	40.8N	124.5W	736	3.0	11	05	1.0
46023	34.3N	120.7W	725	2.5	02	20	1.0
46024	32.8N	119.5W	737	3.0	07	08	1.0
46025	33.6N	119.0W	738	3.0	26	15	0.9
46026	37.8N	122.7W	736	2.5	06	04	1.0
46027	41.8N	124.4W	181	3.0	03	03	1.0
46028	35.8N	121.9W	743	3.0	02	06	1.0
51001	23.4N	162.2W	741	3.0	09	12	1.0
51002	17.2N	157.8W	741	4.5	06	18	1.1
51003	19.2N	160.8W	742	2.5	04	01	1.0
51004	17.5N	152.5W	740	4.0	07	21	1.1
ALRF1	25.0N	080.4W	123	3.0	02	00	0.0
CHLV2	36.9N	075.7W	621	2.0	02	17	0.8

FREQUENCY OF WAVE HEIGHTS (%)

BUOY#	LAT	LONG	CLM	1-1.5M	2-2.5M	3-3.5M	4-5.5M	6-7.5M	8-9.5M	10.5M
41002	32.3N	075.3W	0.6	95.2	4.1					
41004	29.3N	077.3W	9.0	76.7	14.2					
42001	25.9N	089.7W	57.9	23.4	12.0	2.3	3.3	0.7		
42002	26.0N	093.5W	42.6	29.5	7.8					
42003	26.0N	085.9W	81.0	12.4	6.1	0.3				
42007	30.1N	088.9W	57.6	34.9	2.8	0.8				
44004	38.5N	070.7W	7.9	64.4	8.6	15.2	10.1	2.2	1.6	
44005	42.7N	068.4W	77.4	13.3						
44007	43.5N	070.1W	77.6	60.6	3.9	1.2	0.6			
44008	40.5N	069.5W	71.1	22.5	3.3					
44011	41.1N	066.6W	74.3	76.7	1.9					
44012	38.8N	074.4W	44.4	17.9	71.6	7.6	2.8	0.1		
44013	42.6N	070.8W	50.4	41.4	5.6	0.4				
45001	48.0N	087.6W	49.8	57.3	39.6					
45002	45.3N	086.4W	48.7	38.7	2.3					
45003	45.3N	082.8W	78.1	21.4	0.4					
45004	47.2N	086.5W	44.8	38.0	1.7					
45005	41.7N	082.4W	48.8	51.2						
45006	47.3N	090.0W	81.1	48.0	31.9	10.2	1.5			
45007	42.7N	087.1W	33.4	60.4	3.9	1.2	0.6			
45008	44.3N	082.4W	74.1	22.5	3.3					
46011	34.3N	120.3W	21.2	76.7	1.9					
46022	42.5N	130.3W	17.9	71.6	7.6	2.8	0.1			
46023	51.9N	155.7W	58.4	41.4	5.6	0.4				
46034	50.9N	135.9W	57.3	38.6	3.9					
46035	46.1N	131.0W	66.7	32.7	2.3					
46036	40.8N	137.6W	78.1	21.4	0.4					
46010	46.2N	124.2W	33.4	60.4	3.9	1.2	0.6			
46011	34.9N	120.9W	74.1	22.5	3.3					
46012	37.4N	122.7W	21.2	76.7	1.9					
46013	38.2N	123.3W	17.9	71.6	7.6	2.8	0.1			
46014	39.2N	124.0W	50.4	41.4	5.6	0.4				
46022	40.8N	124.5W	57.3	38.6	3.9					
46023	34.3N	120.7W	66.7	32.7	2.3					
46024	32.8N	119.5W	78.1	21.4	0.4					
46025	33.6N	119.0W	81.0	12.4	6.1	0.3				
46026	37.8N	122.7W	57.6	34.9	2.8	0.8				
46027	41.8N	124.4W	7.9	64.4	8.6	15.2	10.1	2.2	1.6	
46028	35.8N	121.9W	77.4	13.3						
46030	40.4N	124.5W	44.4	17.9	71.6	7.6	2.8	0.1		
46011	34.9N	120.9W	74.1	22.5	3.3					
46012	37.4N	122.7W	21.2	76.7	1.9					
46013	38.2N	123.3W	17.9	71.6	7.6	2.8	0.1			
46014	39.2N	124.0W	50.4	41.4	5.6	0.4				
46031	55.5N	161.7W	57.3	38.6	3.9					
46032	54.2N	165.7W	66.7	32.7	2.3					
51001	23.4N	162.2W	78.1	21.4	0.4					
51002	17.2N	157.8W	81.0	12.4	6.1	0.3				
51003	19.2N	160.8W	57.6	34.9	2.8	0.8				
51004	17.5N	152.5W	7.9	64.4	8.6	15.2	10.1	2.2	1.6	
ALRF1	25.0N	080.4W	77.4	13.3						
CHLV2	36.9N	075.7W	44.4	17.9	71.6	7.6	2.8	0.1		

SEPTEMBER 1985			AIR TEMPERATURE (DEG C)							SEA TEMPERATURE (DEG C)							AIR-SEA TEMPERATURE DIFFERENCE (DEG C)						
BUOY	LAT	LONG	OBS	DAYS	MAX	DY HR	MIN	DY HR	MEAN	OBS	DAYS	MAX	DY HR	MIN	DY HR	MEAN	OBS	DAYS	MAX	DY HR	MIN	DY HR	MEAN
41001	34.9N	072.9W	714	30	27.8	07 19	19.7	14 11	24.6	713	30	27.7	09 19	24.2	30 07	25.7	714	30	01.6	27 14	-05.8	14 11	-01.1
41002	32.3N	075.3W	712	30	28.9	09 17	23.0	19 11	26.0	712	30	29.9	09 21	25.8	29 14	27.5	714	30	00.8	27 17	-05.5	12 02	-01.5
41006	29.3N	077.3W	698	30	29.4	09 13	22.6	17 16	26.9	699	30	30.3	09 20	27.0	27 09	28.1	701	30	01.2	09 13	-05.8	13 17	-01.2
42001	25.9N	089.7W	716	30	29.3	02 17	23.5	22 15	27.5	716	30	30.3	06 20	28.0	27 08	29.0	716	30	00.3	23 16	-05.1	15 09	-01.5
42002	26.0N	093.5W	717	30	27.3	26 16	20.3	18 18	25.4	718	30	32.0	01 22	29.3	25 07	30.3	719	30	-02.4	26 15	-09.9	10 20	-04.9
42003	26.0N	085.9W	397	18	29.9	14 00	25.3	20 19	29.0	403	18	30.4	27 20	27.9	20 13	28.5	410	18	01.8	29 07	-02.7	20 19	00.5
42007	30.1N	088.9W	717	30	31.1	12 20	18.5	27 14	26.2	717	30	30.2	11 23	24.7	29 13	26.8	717	30	03.7	26 09	-06.7	27 14	-00.6
44004	38.5N	070.7W	423	18	27.4	11 07	13.9	14 01	22.4	426	18	27.0	02 05	24.3	01 03	25.7	428	18	01.7	11 06	-10.8	13 15	-03.4
44005	42.7N	068.4W	717	30	20.2	27 22	12.2	12 09	15.4	717	30	16.7	17 20	13.4	01 09	15.1	717	30	04.7	27 22	-02.3	11 16	00.2
44007	43.5N	070.1W	717	30	24.3	04 22	09.4	13 11	15.4	717	30	16.7	08 23	12.3	01 13	14.5	718	30	09.9	04 22	-04.5	13 10	00.9
44008	40.5N	069.5W	360	16	22.7	27 19	12.5	16 02	17.1	359	16	19.0	22 17	13.7	18 00	16.0	361	16	05.5	27 19	-02.6	16 04	01.1
44009	38.5N	074.6W	711	30	28.1	10 01	14.8	13 16	21.6	710	30	26.8	10 18	20.6	27 10	23.1	711	30	03.0	04 23	-07.9	13 16	-01.5
44011	41.1N	066.6W	720	30	25.3	27 18	12.7	17 12	17.8	719	30	25.2	20 18	14.1	29 09	18.7	720	30	05.1	08 02	-07.8	18 08	-00.9
44012	38.8N	074.6W	706	30	28.3	09 19	14.4	13 15	21.6	708	30	26.1	10 18	20.6	29 01	22.7	711	30	03.1	04 21	-08.4	13 13	-01.1
44013	42.4N	070.8W	717	30	26.7	20 20	09.7	13 11	16.9	716	30	20.4	08 22	13.6	28 02	16.5	717	30	09.8	04 19	-06.0	13 11	00.4
45001	48.0N	087.6W	694	30	17.1	20 05	04.7	30 17	11.1	695	30	13.3	18 21	06.6	30 20	10.5	709	30	04.6	20 05	-03.6	21 21	00.6
45002	45.3N	086.3W	707	30	21.6	07 19	08.0	25 08	16.0	705	30	19.5	05 17	13.2	25 12	17.4	712	30	03.4	23 18	-07.6	25 08	-01.4
45003	45.3N	082.8W	717	30	20.9	04 02	09.0	25 11	15.6	717	30	19.1	08 20	14.9	27 04	16.5	717	30	03.6	04 02	-06.5	11 14	-00.9
45004	47.2N	086.5W	716	30	18.7	20 00	07.1	25 11	12.4	715	30	14.0	08 04	08.3	30 20	11.9	716	30	05.7	20 04	-03.9	21 14	00.4
45005	41.6N	082.4W	500	22	27.5	07 22	13.0	12 14	20.6	500	22	25.3	08 03	20.7	17 11	22.3	501	22	02.7	07 22	-09.3	12 14	-01.8
45006	47.3N	090.0W	714	30	19.0	19 21	03.5	30 23	11.8	714	30	14.8	12 21	05.9	24 14	10.8	715	30	05.8	19 21	-03.4	24 06	01.0
45007	42.7N	087.1W	717	30	24.5	07 23	09.5	24 11	18.2	717	30	22.2	07 20	15.2	30 21	19.4	718	30	02.8	19 01	-07.7	24 11	-01.3
45008	44.3N	082.4W	719	30	22.1	04 05	09.4	25 12	16.4	718	30	20.6	07 23	13.6	29 08	16.9	719	30	04.1	04 05	-07.9	12 16	-00.5
46001	56.3N	148.3W	718	30	13.8	07 21	08.2	30 17	11.5	718	30	13.3	03 02	10.2	29 17	11.8	719	30	01.5	27 01	-02.6	07 03	-00.2
46002	42.5N	130.3W	717	30	17.4	02 02	13.6	01 05	15.9	717	30	17.6	01 01	16.3	20 13	16.8	717	30	00.4	25 23	-03.8	01 05	-00.9
46003	51.9N	155.7W	715	30	14.4	21 23	09.9	25 04	12.0	715	30	12.5	07 01	11.1	30 14	11.7	715	30	02.8	21 23	-01.9	10 11	00.3
46004	50.9N	135.9W	720	30	14.9	01 22	11.6	11 16	13.4														
46005	46.1N	131.0W	441	20	16.4	28 01	13.4	29 13	14.8	441	20	16.1	01 23	15.3	18 09	15.6	701	30	00.8	28 01	-01.9	29 13	-00.8
46006	40.8N	137.6W	718	30	17.8	01 03	14.9	10 04	16.3	718	30	18.1	01 01	17.0	29 17	17.5	718	30	00.0	21 19	-02.7	10 04	-01.2
46010	46.2N	124.2W	710	30	20.3	27 23	10.1	27 15	13.8	710	30	16.5	02 21	11.8	30 06	14.3	710	30	06.3	27 23	-04.0	22 19	-00.5
46011	34.9N	120.9W	694	30	19.7	25 19	12.1	22 16	15.4	694	30	18.5	27 22	13.8	24 14	15.5	694	30	04.9	25 19	-02.8	18 13	-00.2
46012	37.4N	122.7W	718	30	17.8	27 19	12.3	21 08	15.0	718	30	16.4	06 01	13.1	01 13	15.0	718	30	02.5	27 19	-03.0	21 08	-00.1
46013	38.2N	123.3W	713	30	16.6	06 01	10.1	21 16	13.4	713	30	16.0	09 02	10.6	01 10	13.2	716	30	02.9	01 04	-02.6	10 17	00.2
46014	39.2N	124.0W	602	26	16.0	15 01	09.7	25 14	13.0	602	26	15.9	14 08	11.3	18 14	13.3	602	26	02.7	19 01	-03.3	25 14	-00.3
46016	63.3N	170.3W	211	30	09.4	05 21	-00.5	22 15	04.6														
46017	60.3N	172.3W	201	30	09.7	04 21	01.9	16 06	06.0														
46022	40.8N	124.5W	716	30	16.4	15 01	08.2	24 15	13.1	716	30	15.8	15 00	10.6	25 13	13.1	716	30	01.7	18 04	-03.5	24 15	00.0
46023	34.3N	120.7W	715	30	20.5	08 00	12.9	23 14	16.1	715	30	19.7	06 23	13.4	13 07	16.5	715	30	03.0	25 08	-02.7	23 12	-00.3
46024	32.8N	119.5W	710	30	20.7	07 23	16.1	16 16	18.0	710	30	21.1	06 22	18.4	20 12	19.2	710	30	01.0	25 05	-02.6	22 20	-01.2
46025	33.6N	119.0W	718	30	21.9	26 00	16.5	03 16	18.7	718	30	22.2	07 00	18.8	18 04	20.0	718	30	01.6	25 20	-03.7	11 13	-01.3
46026	37.8N	122.7W	711	30	17.0	26 20	11.1	20 10	13.9	711	30	16.1	26 21	12.5	03 06	14.5	712	30	01.4	02 02	-03.6	22 02	-00.6
46028	35.8N	121.9W	719	30	18.6	26 01	12.7	25 11	15.5	719	30	18.9	07 01	12.1	01 12	15.5	719	30	02.9	01 07	-02.5	04 07	00.0
46030	40.4N	124.5W	716	30	16.7	14 23	08.1	24 14	12.3	715	30	17.5	14 23	10.3	04 19	12.5	717	30	01.8	04 19	-04.1	24 19	-00.3
46035	57.0N	177.7W	378	18	09.9	14 01	05.5	15 14	07.4														
51001	23.4N	162.3W	718	30	27.2	17 03	23.4	11 14	25.8	718	30	27.8	25 00	26.5	22 12	26.9	719	30	-00.1	17 02	-03.8	06 00	-01.1
51002	17.2N	157.8W	718	30	27.0	26 03	23.2	04 17	25.8	718	30	28.6	26 02	26.2	07 13	26.9	719	30	00.0	19 18	-03.3	27 18	-01.1
51003	19.2N	160.8W	714	30	28.8	09 04	23.5	30 19	26.6	714	30	29.7	10 03	27.1	03 17	27.6	714	30	00.6	09 04	-04.0	30 19	-01.0
51004	17.5N	152.5W	715	30	27.8	09 02	22.6	21 17	25.6	715	30	28.4	10 02	26.1	01 14	26.5	716	30	00.5	09 00	-03.6	21 17	-00.8
ALRF1	24.9N	080.6W	718	30	30.0	27 20	22.5	18 12	27.1	718	30	30.0	06 21	26.6	17 08	28.3	718	30	01.3	21 13	-05.3	10 23	-01.2
ALSN6	40.5N	073.8W	719	30	30.2	05 23	11.0	13 11	20.0														
BURL1	28.9N	089.4W	702	30	31.8	12 20	21.7	27 11	26.7														
BUZM3	41.4N	071.0W	716	30	24.8	05 22	11.1	13 12	18.0														
CARO3	43.3N	124.4W	719	30	18.7	26 01	07.1	29 15	12.6														
CHLV2	36.9N	075.7W	719	30	30.8	06 19	15.7	14 02	22.7	719	30	27.4	07 21	22.2	29 07	24.4	719	30	04.6	06 19	-08.3	14 02	-01.7
CLKN7	34.6N	076.5W	694	30	30.0	11 16	16.8	14 02	23.6														
CSBF1	29.7N	085.4W	691	30	30.9	12 15	19.7	14 10	25.6														
DBLN6	42.6N	079.4W	719	30	26.7	23 19	07.5	14 11	18.2														
DESW1	47.7N	124.5W	718	30	16.2	28 03	09.0	22 13	12.8														
DISW3	47.1N	090.7W	716	30	28.5	19 19	03.8	30 21	12.7														
DSLN7	35.2N	075.3W	718	30	28.7	07 21	18.2	14 03	24.2	623	26	29.0	08 23	23.3	01 12	26.1	719	30	01.2	20 13	-07.0	14 03	-01.9
FBIS1	32.7N	079.9W	705	30	30.9	11 18	16.7	28 09	24.5														
FFIA2	57.3N	133.6W	719	30	14.5	08 23	04.8	27 15	09.8														
FPSN7	33.5N	077.6W	718	30	29.2	11 17	17.4	14 07	24.6	609	26	28.5	11 18	24.7	18 09	26.4	718	30	01.8	03 16	-08.4	14 10	-01.8
GDIL1	29.3N	089.9W	716	30	31.2	12 19	19.7	27 14	26.5	718	30	31.2	13 02	23.9	28 14	27.6	718	30	02.0	29 18	-05.8	26 15	-01.2
GLLN6	43.9N	076.4W	718	30	23.2	23 19	09.1	13 11	17.0														
IOSN3	42.9N	070.6W	717	30	27.2	20 22	08.7	12 12	16.2														
LKWF1	26.6N	080.0W	713	30	30.6	26 21	20.5	18 16	27.1	712	30	29.4	10 20	26.0	21 10	27.8	714	30	02.7	26 21	-06.4	18 20	-00.7
MDRM1	44.0N	068.1W	714	30	18.3	27 22	09.6	12 12	13.5														
MISM1	43.8N	068.9W	719	30	21.8	09 00	09.6	12 11	13.7														
NWPO3	44.6N	124.1W	708	30	24.0	25 18	04.9	30 14	12.6														
PILM4	48.2N	088.4W	718	30	19.2	20 08	04.2	30 20	11.7														
PTAC1	38.9N	123.7W	718	30	17.8	11 23	08.6	11 13	12.5														
PTAT2	27.8N	097.1W	643	30	29.5	02 23	21.0	30 07	27.5														
PTGC1	34.6N	120.7W	697	30	22.8	25 13	11.2	24 15	15.4														
ROAM4	47.9N	089.3W	701	30	18.4	20 02	03.8	30 23	11.9														
SBIO1	41.7N	082.8W	717	30	30.5	07 20	11.3	24 12	19.6														
SGNW3	43.8N	087.7W	717	30	28.7	06 18	04.4	25 07	15.7														
SISW1	48.3N	122.9W	720	30	19.4	10 22	07.1	22 14	12.2														
SJLF1	30.4N	081.4W	719	30	32.1	09 16	21.2	17 14	25.6														
SRST2	29.7N	094.1W	688	30	34.6	01 19	18.9	28 11	26.1														
STDM4	47.2N	087.2W	708	30	20.6	06 23	04.8	24 15	12.9														
SVLS1	31.9N	080.7W	717	30	29.5	11 21	17.6	14 15	24.9	718	30	29.3	09 00	23.6	30 11	26.4	720	30	02.1	04 14	-09.3	14 15	-01.5
TTIW1	48.4N	124.7W	718	30	19.1	27 23	07.4	23 12	11.8														
WPOW1	47.7N	122.4W	719	30	18.3	28 19	08.6	18 16	13.0														

SEPTEMBER 1985			PRESSURE (MB)							WIND SPEEDS (KNOTS)				MEAN WIND SPEED (KNOTS)								
BUOY	LAT	LONG	OBS	DAYS	MAX	DY HR	MIN	DY HR	MEAN	OBS	MAX	DY HR	DIR	N	NE	E	SE	S	SW	W	NW	TOTAL
41001	34.9N	072.9W	714	30	1027.7	15 03	1000.0	27 07	1020.1	708	37	27 06	160	10.8	11.3	12.9	19.9	14.2	9.9	7.9	10.0	11.2
41002	32.3N	075.3W	700	30	1026.3	29 15	999.5	27 03	1019.9	695	51	27 01	240	11.1	15.9	14.2	10.1	8.2	9.1	4.7	8.1	12.1
41006	29.3N	077.3W	688	30	1023.1	29 16	1000.2	26 18	1017.5	679	29	26 09	350	13.4	15.1	11.3	6.6	5.3	5.8	7.6	12.2	11.1
42001	25.9N	089.7W	716	30	1020.3	07 17	1009.9	21 11	1015.0	712	26	15 13	060	4.5	12.8	11.2	10.8	12.5	12.6	9.4	7.9	11.4
42002	26.0N	093.5W	718	30	1020.3	07 17	1009.0	22 09	1014.7	718	33	30 19	340	10.2	14.5	13.7	14.9	12.8	9.8	8.5	9.1	13.7
42003	26.0N	085.9W	397	18	1019.5	28 16	1011.3	27 00	1015.3	398	31	15 05	070	6.7	16.2	17.7	13.4	13.5		5.0	8.3	15.5
42007	30.1N	088.9W	711	30	1023.7	14 16	1002.8	02 08	1017.2	701	53	02 12	290	11.6	12.7	13.1	12.1	9.0	8.5	6.6	9.2	11.6
44004	38.5N	070.7W	424	18	1029.0	15 02	1009.2	11 09	1019.4	417	30	14 02	010	13.7	12.8	6.6	9.8	7.2	13.9	14.9	11.9	13.4
44005	42.7N	068.4W	717	30	1028.2	18 13	1000.2	27 23	1019.7	698	29	28 00	190	11.5	8.2	8.5	10.5	9.6	9.7	6.3	8.5	08.9
44007	43.5N	070.1W	716	30	1028.2	13 15	987.1	27 23	1019.4	693	45	27 22	170	9.0	7.2	9.1	8.9	8.2	9.3	5.9	9.7	08.6
44008	40.5N	069.5W	360	16	1027.9	29 14	1002.3	27 19	1021.0	358	35	27 17	160	3.6	5.7	9.8	12.9	9.2	9.5	9.2	4.8	08.4
44009	38.5N	074.6W	704	30	1032.7	14 15	994.8	27 08	1020.9	654	49	27 15	290	11.1	11.0	10.0	5.6	6.4	9.5	9.5	11.1	09.8
44011	41.1N	066.6W	720	30	1028.0	18 14	1007.2	01 00	1019.6	717	27	27 23	180	9.2	8.0	9.6	11.0	14.4	12.0	10.7	7.7	09.7
44012	38.8N	074.6W	700	30	1032.8	14 15	993.5	27 09	1020.7	681	43	27 11	090	11.8	11.1	9.8	6.1	8.6	9.2	9.4	12.2	10.0
44013	42.4N	070.8W	717	30	1029.5	15 14	986.6	27 21	1019.9	705	47	27 20	170	9.2	8.8	8.6	9.6	9.4	9.0	8.2	9.4	09.0
45001	48.0N	087.6W	700	30	1039.0	13 16	984.7	24 03	1016.4	670	37	30 23	050	7.2	13.7	9.8	9.3	10.3	10.3	12.0	7.8	10.4
45002	45.3N	086.3W	707	30	1039.3	13 16	995.6	24 00	1018.1	684	33	24 03	240	9.7	8.8	6.5	7.8	9.9	14.6	11.4	12.5	11.8
45003	45.3N	082.8W	717	30	1038.1	13 15	1002.7	24 03	1018.5	706	25	24 08	260	9.3	9.9	8.7	9.8	11.5	10.6	11.5	9.1	10.3
45004	47.2N	086.5W	714	30	1038.9	13 16	990.4	24 03	1016.9	706	30	24 04	200	7.8	9.4	9.4	9.6	11.3	10.9	13.6	8.3	10.1
45005	41.6N	082.4W	500	22	1037.3	13 16	1010.8	05 23	1021.9	491	19	11 03	020	10.7	9.6	7.1	6.3	6.4	8.5	7.2	10.9	08.3
45006	47.3N	090.0W	713	30	1038.4	13 16	990.4	24 00	1016.0	706	29	24 06	290	6.6	11.5	7.5	5.8	7.7	8.6	11.9	5.8	08.9
45007	42.7N	087.1W	717	30	1038.9	13 16	1001.8	23 21	1018.9	701	31	24 00	250	11.1	11.3	12.0	10.2	12.9	11.1	10.7	9.4	12.2
45008	44.3N	082.4W	718	30	1037.2	13 16	1005.0	26 16	1018.7	698	25	24 05	250	10.5	7.5	7.5	9.2	11.4	9.3	11.8	6.1	09.7
46001	56.3N	148.3W	719	30	1030.9	06 23	998.6	24 15	1016.4	715	30	29 12	150		12.0	17.1	17.1	11.9	14.5	14.2	12.3	14.1
46002	42.5N	130.3W	717	30	1028.6	20 18	1009.3	11 23	1018.9	717	23	17 18	350	15.9	16.4			11.9	14.4	16.3	14.1	15.5
46003	51.9N	155.7W	715	30	1034.7	06 20	993.4	29 03	1018.5	712	33	29 00	160	8.3	5.4	14.3	14.1	16.1	16.5	14.0	13.4	15.0
46004	50.9N	135.9W	720	30	1029.8	25 00	1004.4	12 04	1021.2	711	27	12 04	340	13.1	9.4	6.5	6.0	6.8	12.9	13.4	14.3	13.0
46005	46.1N	131.0W	441	20	1029.6	20 05	1012.2	06 01	1023.6	441	27	05 15	300	15.0	13.1	8.7	10.7	11.8		18.4	17.2	15.5
46006	40.8N	137.6W	718	30	1034.2	20 19	1016.7	27 03	1025.6	718	18	24 18	040	10.6	11.4	9.2				9.5	10.2	10.7
46010	46.2N	124.2W	710	30	1025.2	20 05	1004.2	06 07	1016.6	693	24	12 06	160	9.7	7.9	9.2	10.0	13.7	8.4	8.4	8.3	09.6
46011	34.9N	120.9W	694	30	1020.1	12 07	1008.9	18 12	1015.0	675	23	15 01	320	7.1	3.7	3.0	4.4	5.1	4.6	5.3	12.1	09.0
46012	37.4N	122.7W	718	30	1022.1	12 16	1007.2	18 13	1015.1	716	20	15 04	320	6.3	1.3	2.5	6.2	6.4	3.5	4.5	8.7	06.7
46013	38.2N	123.3W	715	30	1022.8	12 18	1007.3	18 10	1015.2	652	26	03 01	320	3.9	2.5	4.1	5.1	5.4	5.0	5.0	11.5	08.2
46014	39.2N	124.0W	602	26	1022.3	12 18	1007.3	18 03	1015.2	560	23	18 03	320	6.9	3.7	4.3	6.3	6.1	5.1	5.1	10.4	07.6
46016	63.3N	170.3W	211	30	1026.7	05 09	985.9	14 12	1007.5	212	38	14 06	030	10.4	14.1	9.5	10.8	12.3	9.9	7.7	8.4	10.6
46017	60.3N	172.3W	201	30	1026.3	16 21	984.7	14 15	1007.0	210	28	26 03	110	14.3	9.8	11.7	12.0	14.8	12.8	12.9	10.1	12.5
46022	40.8N	124.5W	716	30	1022.8	14 21	1010.2	17 13	1015.5	674	22	18 11	350	11.0	3.9	3.0	6.2	8.7	6.9	3.2	5.9	08.5
46023	34.3N	120.7W	715	30	1021.0	08 19	1008.9	18 12	1015.2	689	25	02 14	330	10.3	1.4	6.0	5.1	5.6	6.8	6.1	14.8	12.5
46024	32.8N	119.5W	710	30	1019.7	08 18	1009.3	18 12	1014.8	688	21	02 07	310	6.3	3.3	4.0	5.8	6.1	4.7	9.8	13.0	11.0
46025	33.6N	119.0W	718	30	1018.6	08 18	1007.8	18 12	1013.3	682	22	03 01	280	3.8	4.0	3.7	4.4	3.4	4.9	8.5	6.6	07.0
46026	37.8N	122.7W	711	30	1023.3	12 17	1007.7	18 12	1015.7	673	19	15 02	300	3.0	1.4	3.3	6.9	6.5	4.8	8.0	10.0	07.3
46028	35.8N	121.9W	719	30	1020.1	12 09	1008.1	18 11	1014.5	695	26	16 05	320	6.7	3.5	3.5	5.3	4.9	3.1	3.8	13.1	09.8

SEPTEMBER 1985			PRESSURE (MB)							WIND SPEEDS (KNOTS)			MEAN WIND SPEED (KNOTS)							
BUOY#	LAT	LONG	OBS	DAYS	MAX	DY HR	MIN	DY HR	MEAN	OBS	MAX	DY HR	DIR	N	NE	E	SE	S	SW	W	NW	TOTAL
46JN1	40.4N	124.5W	716	30	1022.7	11 21	1010.3	17 13	1015.5	674	19	21 13	350	9.08	3.7	4.0	3.6	8.8	0.7	5.3	4.2	07.6
46D35	57.0N	177.7W	378	16	1024.4	17 00	980.1	16 08	1006.4	371	27	25 01	130	10.5	10.3	9.7	19.0	11.3	6.6	7.7	7.2	10.3
51001	23.4N	162.3W	716	30	1020.4	30 08	1011.2	27 02	1016.0	710	22	10 04	110	8.2	10.2	11.3	7.1	2.6	6.2	7.3	6.9	10.6
51002	17.2N	157.8W	716	30	1016.6	01 21	1010.0	12 02	1013.4	716	21	17 15	090	6.6	9.2	12.5	8.6					11.6
51003	19.2N	160.8W	716	30	1017.7	02 09	1010.7	12 02	1014.5	692	18	20 03	080	8.1	9.0	9.8	9.1	4.0	1.8	3.8	3.9	09.0
51004	17.5N	152.5W	716	30	1016.6	03 08	1008.3	17	1012.6	700	19	22 12	060	10.2	13.0	11.6	6.1					12.0
ALRF1	29.9N	080.6W	718	30	1020.1	03 15	1009.3	26 08	1015.6	709	17	24 15	110	11.1	13.6	11.5	9.1	10.3	1.0	8.5	8.6	11.6
ALSN6	40.5N	073.8W	714	30	1032.9	14	988.6	27 18	1021.0	707	29	28 17	300	12.0	11.5	10.8	15.9	7.1	12.1	12.0	13.1	12.6
BURL1	28.9N	089.4W	700	30	1027.1	15 15	1005.6	02 10	1016.6	688	17	24 02	170	10.8	15.8	10.8	12.9	12.5	11.0	11.2	9.7	12.6
BUZM3	41.4N	071.0W	716	30	1030.3	14	992.6	27 19	1020.3	701	27	27 18	160	11.9	11.2	14.7	14.5	12.0	13.2	10.2	10.0	12.2
CAR03	43.3N	124.4W	719	30	1028.5	20 16	1010.4	06 11	1017.2	690	25	12 10	190	9.2	6.0	2.1	5.3	10.1	6.0	3.1	1.5	07.0
CHLV2	36.9N	075.7W	716	30	1031.7	14 15	997.1	27 08	1020.7	684	29	27 10	290	14.1	11.0	9.6	6.1	6.8	10.6	16.5	17.2	11.5
CLKN7	34.6N	076.5W	702	30	1029.3	14 15	998.8	26 21	1020.6	692	19	26 17	050	12.7	14.9	9.1	6.8	6.8	6.8	10.1	13.5	11.2
CSBF1	29.7N	085.4W	710	30	1028.8	14	1000.8	02 13	1017.7	701	18	02 00	100	4.7	5.3	6.4	5.9	3.9	3.7	6.5	3.7	05.6
DBLN6	42.6N	079.4W	718	30	1036.8	14	1008.8	27 17	1028.9	693	17	24 12	270	9.1	9.0	6.6	7.3	6.6	11.8	10.0	8.4	09.5
DESW1	47.7N	124.5W	718	30	1029.9	20 14	1002.4	06 07	1016.5	700	17	35 12	260	6.9	4.3	4.8	11.8	9.0	4.3	10.1	8.2	08.8
DISW3	47.1N	090.7W	718	30	1039.3	13 16	993.2	23 23	1016.0	697	17	26 08	250	12.9	13.1	7.1	6.0	8.8	13.2	15.9	10.5	11.0
DSLN7	35.2N	075.3W	711	30	1029.2	15 05	993.0	27 01	1020.6	616	24	27 05	130	17.9	15.7	10.2	12.2	7.6	12.3	10.4	11.4	14.3
FBIS1	32.7N	079.9W	717	30	1030.2	14 15	1003.7	26 23	1020.3	695	23	16 04	060	8.5	12.7	12.7	7.8	6.7	7.8	6.7	8.0	09.7
FFIA2	27.8N	133.6W	719	30	1030.0	26	997.4	16	1017.4	657	17	31 25	140	10.4	5.3	1.7	13.2	7.9	3.2	3.2	3.3	07.6
FPSN7	33.5N	077.6W	688	30	1028.3	14 15	999.0	26 19	1019.8	707	17	34 26	220	20.5	17.6	10.4	2.7	7.3	9.7	8.9	11.2	13.7
GDIL1	29.3N	089.9W	719	30	1022.2	15 14	1006.2	02 11	1016.6	699	17	24 14	060	11.2	11.4	11.4	7.6	8.8	6.2	6.5	7.5	09.7
GLLN6	43.0N	070.4W	718	30	1033.2	14 13	1001.3	27 20	1019.6	708	17	28 27	310	6.0	7.1	6.1	11.6	10.5	9.2	10.9	10.2	09.6
IOSN3	42.9N	070.6W	717	30	1028.5	14 14	986.3	27 23	1019.3	708	17	55 27	260	10.9	10.2	11.2	11.1	11.5	12.6	10.2	9.1	10.8
LKWF1	26.6N	080.0W	713	30	1021.5	03 14	1007.2	26 09	1016.2	708	17	26 15	070	9.5	13.3	10.6	7.5	12.4	2.7	3.8	4.0	10.0
MDRM1	44.0N	068.1W	716	30	1028.2	23 13	998.2	27 23	1019.6	697	17	43 27	240	11.8	10.8	8.0	12.3	11.2	11.2	9.8	10.8	10.5
MISW1	43.6N	068.9W	718	30	1028.3	23 12	998.4	27 23	1019.9	699	17	49 28	000	11.5	10.1	10.2	12.2	12.5	11.6	9.8	11.7	11.1
NWP03	48.6N	124.1W	718	30	1024.7	20 15	1000.3	06 07	1016.5	700	17	25 12	190	8.3	3.3	4.9	4.0	9.8	5.7	4.7	6.9	06.7
PILM4	48.2N	088.4W	718	30	1038.6	13 16	982.9	24 03	1015.8	692	17	44 26	140	6.6	11.7	10.7	13.2	12.0	14.9	15.6	6.0	12.2
PTAC1	38.9N	123.7W	718	30	1027.4	12 17	1007.5	11 09	1016.8	611	17	24 16	170	5.7	2.6	3.4	5.7	7.0	2.7	2.2	5.9	05.4
PTAT2	27.8N	097.1W	656	30	1021.1	30 16	1007.8	22 23	1014.2	681	17	29 23	020	19.4	14.3	13.8	15.2	15.3	7.2	4.3	14.7	14.5
PTGC1	34.6N	120.7W	697	30	1020.2	11 07	1009.0	18 11	1015.2	661	17	26 02	150	12.5	9.1	1.7	4.2	6.1	2.5	4.9	11.9	09.6
ROAN1	47.9N	089.3W	701	30	1034.2	13 15	987.0	24 01	1015.0	674	17	43 24	260	11.5	14.0	10.2	11.5	14.4	13.5	11.4	11.8	12.4
SBIO1	41.7N	082.8W	716	30	1037.6	13 16	1006.8	26 08	1020.9	704	17	28 24	300	5.7	4.9	5.6	8.1	8.8	9.4	10.7	9.4	08.4
SGNW3	43.8N	087.7W	716	30	1038.6	13 16	997.8	23 21	1017.7	680	17	33 23	230	10.2	9.9	8.6	9.3	11.5	9.6	11.3	8.4	10.4
SISW1	48.3N	122.9W	719	30	1027.2	24 18	998.6	06 07	1016.7	710	17	30 17	240	4.5	8.1	3.4	10.8	7.1	6.7	6.8	5.0	06.7
SJLF1	30.4N	081.4W	716	30	1026.4	14 16	1006.5	26 21	1015.8	710	17	41 01	090	10.7	14.5	13.3	10.8	8.0	3.6	4.3	4.9	11.3
SRST2	29.7N	096.1W	717	30	1022.6	15 15	1008.2	22 23	1016.1	707	17	32 06	100	8.8	8.0	11.3	12.7	11.6	15.4	8.3	6.5	11.0
STDM4	47.2N	087.2W	709	30	1039.1	13 16	988.6	24 02	1016.9	686	17	41 24	250	11.5	10.6	14.2	14.4	17.3	13.1	10.6	12.2	14.0
SVLS1	31.9N	080.7W	719	30	1029.0	14 15	1009.6	26 21	1019.4	709	17	38 14	070	8.4	20.3	15.1	8.9	8.0	10.4	9.7	10.4	14.7
TTIW1	48.4N	124.7W	718	30	1026.5	20 05	1001.0	06 09	1017.2	716	17	25 17	070	2.5	7.5	9.9	10.7	9.7	9.1	11.4	3.6	08.0
WPO.1	47.7N	122.4W	720	30	1026.2	20 15	999.6	06 07	1016.8	694	17	27 06	180	5.2	5.3	3.9	3.8	8.5	8.3	8.6	1.2	06.8

SEPTEMBER 1985			TOTAL FREQUENCY OF WIND SPEEDS (%)							TOTAL FREQUENCY OF WIND DIRECTIONS (%)							
BUOY#	LAT	LONG	CALM	<1KT	1-10KT	11-21KT	22-33KT	34-47KT	>47KT	N	NE	E	SE	S	SW	W	NW
41001	34.9N	072.9W			4.0	50.1	41.1	4.1	0.7								
41002	32.3N	075.3W			9.4	38.6	44.7	5.2	1.9	0.3	10.8	33.4	15.1	3.7	3.9	17.0	16.4	1.7
41006	29.3N	077.3W			8.5	43.0	41.4	7.1			7.0	35.6	17.2	2.6	6.3	16.0	8.7	6.5
42001	25.9N	089.7W			5.4	40.6	54.0	0.0			8.9	28.2	28.0	9.5	6.6	8.0	8.0	4.5
42002	26.0N	093.5W			1.7	23.8	68.5	6.0			14.2	21.9	20.9	5.4	1.5	2.2	6.1	6.0
42003	26.0N	085.9W			1.0	20.6	62.1	16.3			5.5	19.4	32.9	20.2	0.2	2.0	1.8	2.0
42007	30.1N	088.8W			7.1	37.2	51.3	4.4	0.1	0.3	4.1	35.2	38.0	15.5	3.0		0.3	4.0
44004	38.5N	070.7W			2.4	28.8	61.4	7.4			9.2	33.7	24.7	16.6	5.1	1.4	0.3	2.4
44005	42.7N	068.4W			9.5	61.2	27.5	1.9			39.2	13.9	1.2	0.8	1.4	16.9	14.6	12.1
44007	43.5N	070.1W	5.2		11.0	60.9	24.6	0.9	0.7		9.2	5.8	16.0	8.6	6.4	22.9	15.8	15.9
44008	40.5N	069.5W	7.0		12.6	60.4	24.6	2.0	0.4		10.3	9.2	13.0	6.9	10.8	25.4	11.5	13.0
44009	38.5N	074.6W	4.6		8.7	55.5	33.6	0.8	1.2	0.2	8.4	19.0	14.2	9.1	7.7	24.5	10.0	7.1
44011	41.1N	066.6W			9.3	50.5	37.7	2.5			14.4	22.1	7.1	4.4	9.8	20.6	11.5	10.0
44012	38.8N	074.6W	3.5		8.1	55.7	33.0	0.9	0.9		29.8	13.1	10.3	7.5	4.6	4.2	19.8	13.6
44013	42.4N	070.8W	4.0		7.9	62.6	26.1	0.6	0.9		16.3	15.1	15.6	4.0	5.7	17.3	7.9	8.2
45001	48.0N	087.6W	6.4		9.3	50.9	31.8	7.9	0.1		8.6	11.0	13.5	9.0	9.3	22.3	11.5	15.0
45002	45.3N	086.5W	4.5		8.6	35.7	52.3	3.4			8.8	12.5	5.7	16.0	17.0	15.9	18.2	5.9
45003	45.3N	082.8W			3.5	51.0	44.5	1.0			11.1	7.5	3.7	8.2	9.2	42.7	10.7	6.9
45004	47.2N	086.5W			9.1	47.9	38.8	4.7			8.3	10.6	6.9	5.3	21.0	24.3	8.4	14.7
45005	41.6N	082.4W			10.4	63.5	26.1				14.0	9.1	7.8	10.0	21.5	14.7	10.6	12.3
45006	47.3N	090.0W	6.5		15.3	53.4	30.8	4.2			9.4	17.6	7.0	8.8	14.6	37.0	5.0	0.7
45007	42.7N	087.1W	2.1		2.6	34.2	61.5	1.7			5.3	7.8	17.6	12.5	7.8	17.6	16.9	14.5
45008	44.3N	082.4W	5.3		11.3	46.0	41.5	1.0			8.6	10.0	6.9	11.9	42.6	10.4	4.5	5.0
46001	56.3N	148.3W			2.0	28.1	56.6	13.1			14.3	13.0	5.1	8.7	28.0	14.2	8.5	8.1
46002	42.5N	130.3W				12.0	85.4	2.6				0.5	1.1	10.9	12.2	26.6	38.8	12.9
46003	51.9N	155.7W			1.8	20.9	64.2	13.1			58.6	3.7	0.9	3.3	6.8	21.8	35.5	20.9	6.9
46004	50.9N	135.9W			2.4	32.3	60.2	5.1			3.9	0.9	3.3	6.8	21.8	35.5	20.9	6.9
46005	46.1N	131.0W				18.8	66.0	15.2			21.6	9.1	1.8	2.8	1.6	12.0	23.2	32.9
46006	40.8N	137.6W			0.8	44.4	54.7				48.2	17.7	2.0	0.6	0.9		9.2	21.3
46010	46.2N	124.2W			10.5	48.5	39.7	1.3			47.1	31.7	0.9				1.5	18.8
46011	34.9N	120.9W			17.0	46.2	36.3	0.4			29.4	5.4	9.7	6.0	13.9	6.1	10.3	29.1
46012	37.4N	122.7W			25.6	55.4	18.6				12.6	7.7	3.5	6.1	4.5	6.3	7.6	38.7
46013	38.2N	123.3W			23.0	48.0	26.2	2.8			6.6	1.1	2.1	13.2	21.6	6.1	10.8	37.9
46014	39.2N	124.0W			18.6	58.6	22.3	0.5			5.3	2.6	5.4	6.7	9.5	6.4	12.8	51.3
46016	63.3N	176.7W			5.2	58.0	35.9	0.4	0.5		22.9	4.0	4.8	12.3	19.9	3.1	2.6	39.2
46017	60.3N	172.3W			4.3	35.7	51.9	8.1			17.2	10.5	8.1	10.4	19.4	10.7	7.7	7.7
46022	40.8N	124.5W			19.1	45.8	34.7	0.3			13.1	11.3	12.0	10.4	15.7	19.4	6.0	10.1
46023	34.3N	120.7W			8.4	26.7	58.8	4.1			46.6	3.7	3.8	8.6	15.8	6.4	5.6	9.6
46024	32.8N	117.5W			5.5	40.4	54.1				8.3	0.7	1.2	2.9	7.3	3.4	9.7	76.5
46025	33.6N	119.0W			17.9	65.4	16.4	0.3			5.8	1.1	2.4	3.5	2.4	20.5	61.9
46026	37.8N	122.7W			18.0	60.5	21.5				4.1	5.0	1.9	2.5	2.6	10.9	56.4	16.5
46027	35.8N	121.9W			14.3	62.4	23.3	3.9			1.1	0.4	0.4	3.0	19.5	20.4	36.0	17.3
46030	40.4N	124.5W	16.5		19.8	50.0	30.2				12.6	7.4	2.4	13.0	9.2	6.7	7.6	39.1
46035	57.0N	177.7W			11.1	45.3	38.0	5.7			53.6	6.3	0.2	18.0	13.8	3.4	0.6	9.3
51001	23.4N	162.3W			4.6	41.5	53.7	0.1			28.3	17.5	5.9	6.9	9.3	8.6	10.7	14.8
51002	17.2N	157.8W			3.1	35.6	61.3				6.8	34.7	12.3	1.4	0.5	1.0	1.5	1.7
51003	19.2N	160.8W			8.1	53.4	38.6				15.9	15.9	52.3	1.4				14.5
51004	17.5N	152.5W			4.7	24.4	70.7	0.1			4.3	25.9	58.5	5.2	0.6	<.05	2.0	3.5
ALRF1	29.9N	080.6W	3.1		9.4	33.9	51.8	0.8	0.1		7.6	47.1	41.3	1.6				0.3
ALSN6	40.5N	073.8W	1.7		7.2	35.1	50.1	6.2	1.0	0.4	6.2	18.8	13.9	4.8	7.4	4.0	1.5	3.2	1.9
BURL1	28.9N	089.4W	2.8		9.0	33.1	47.8	9.9	0.1		9.0	31.6	26.9	16.1	4.4	6.2	2.7	7.1
BUZM3	41.4N	071.0W	2.4		5.8	36.3	50.9	5.0	1.0	0.7	11.1	19.5	10.1	3.7	12.7	27.8	11.2	4.0
CAR03	43.3N	124.4W	9.9		28.8	49.1	20.9	1.2			15.9	24.7	4.5	10.5	20.0	18.0	2.9	3.4
CHLV2	36.9N	075.7W	1.8		8.3	40.9	44.2	5.0	0.9	0.7	12.8	31.2	10.1	5.6	13.1	17.3	5.9	3.9
CLKN7	34.6N	076.5W	1.2		5.2	41.3	49.0	3.3	0.9	0.3	17.2	32.0	7.3	4.6	5.2	17.8	11.6	4.3
CSBF1	29.7N	085.4W	3.3		26.8	45.8	24.0	0.1	0.8		4.0	42.9	21.1	10.8	6.0	4.2	3.3	7.5
DBLN6	42.6N	079.4W	3.5		13.3	58.7	24.8	1.2			9.2	5.2	3.9	25.6	17.2	20.8	8.9	5.6
DESW1	47.7N	124.5W	5.9		24.6	50.0	19.9	5.3	0.3		5.2	11.5	11.0	18.9	12.1	5.6	9.4	26.2
DISW3	47.1N	090.7W	2.4		9.0	49.2	32.1	6.8	0.9		12.9	13.1	7.1	6.0	8.8	13.2	15.9	10.5
DSLN7	35.2N	075.3W	1.8		5.4	26.9	53.2	13.0	0.3	1.1	14.5	26.9	13.1	5.3	2.4	18.2	16.9	2.6
FBIS1	32.7N	079.9W	0.7		10.9	45.6	43.0	0.4			6.1	32.3	16.8	6.6	6.7	17.9	7.9	5.6
FFIA2	27.3N	133.6W	26.5		39.5	31.2	29.4	8.9			17.4	8.5	5.1	22.9	19.8	15.8	3.9	6.2
FPSN7	33.5N	077.6W	5.1		7.2	31.1	47.4	14.8	0.4	0.8	7.6	33.6	17.5	7.6	3.6	2.5	12.3	5.4
GDIL1	29.3N	089.9W	4.3		14.4	40.1	44.3	1.1			5.7	21.1	27.4	16.4	14.0	5.7	3.0	4.8
GLLN6	43.0N	070.4W	2.3		10.9	53.2	33.5	2.4			9.1	16.3	3.1	12.1	22.2	12.2	15.3	9.8
IOSN3	42.9N	070.6W	2.8		5.8	46.9	44.5	1.1	0.7	0.6	9.9	20.0	9.6	10.8	9.6	18.4	11.8	10.5
LKWF1	26.6N	080.0W	2.4		12.4	45.1	39.4	3.1			4.5	23.2	38.6	15.7	5.8	1.4	3.7	7.1
MDRM1	44.0N	068.1W	1.9		8.2	48.4	39.9	2.3	1.3		6.7	7.0	11.1	9.5	9.4	25.8	17.5	13.0
MISW1	43.6N	068.9W			8.6	44.6	45.6	1.9	0.9	0.4	7.2	7.0	14.9	8.6	8.8	29.1	13.5	12.1
NWP03	48.6N	124.1W	10.6		26.3	51.6	11.7	0.7			20.2	13.0	17.4	23.0	7.5	6.8	7.5	4.6
PILM4	48.2N	088.4W	2.5		10.1	36.1	43.1	8.7	2.0		10.0	10.7	9.1	11.9	20.4	17.1	13.7	7.0
PTAC1	38.9N	123.7W	14.9		29.0	41.0	10.0				36.5	10.5	5.8	6.3	26.3	2.7	3.0	0.9
PTAT2	27.8N	097.1W	0.3		0.9	19.8	52.5	8.7			16.2	36.9	12.6	3.4	3.3	9.9	2.3	11.4
PTGC1	34.6N	120.7W	6.2		22.3	34.5	30.7	3.5			50.3	3.4	3.8	6.1	14.2	3.1	2.6	14.6
ROAN1	47.9N	089.3W	0.7		6.8	28.9	46.4	15.7	2.1		8.7	18.3	7.4	7.8	13.9	22.8	14.7	6.5
SBIO1	41.7N	082.8W	2.3		11.6	62.4	25.3	0.7			5.1	12.0	7.1	8.3	16.2	31.9	14.1	3.2
SGNW3	43.8N	087.7W	3.8		12.2	38.5	44.6	2.5			9.5	10.7	7.6	6.8	40.9	13.5	3.3	4.7
SISW1	48.3N	122.9W	8.0		33.0	46.6	16.5	3.9			3.1	5.0	5.5	8.6	18.3	14.3	33.4	15.8
SJLF1	30.4N	081.4W	1.4		11.3	38.3	42.1	7.6	0.7		3.2	33.3	26.5	13.6	3.0	6.2	7.5	6.7
SRST2	29.7N	096.1W	0.4		4.7	47.1	45.5	2.7			7.2	20.1	19.1	26.7	19.1	8.0	1.6	7.1
STDM4	47.2N	087.2W	3.2		6.4	27.4	47.7	16.5	2.8		9.4	14.4	8.8	8.5	28.0	9.1	13.7	8.0
SVLS1	31.9N	080.7W	2.1		5.2	29.8	42.9	21.7	0.4		3.8	40.5	11.2	11.3	14.2	6.9	7.0	5.0
TTIW1	48.4N	124.7W	8.8		20.0	41.3	30.2	2.4			2.2	23.1	27.4	9.6	18.8	12.3	7.7	3.6
WPOW1	47.7N	122.4W	11.2		30.7	55.3	12.2	1.7			20.4	31.1	1.0	9.2	31.7	2.6	1.3	2.6

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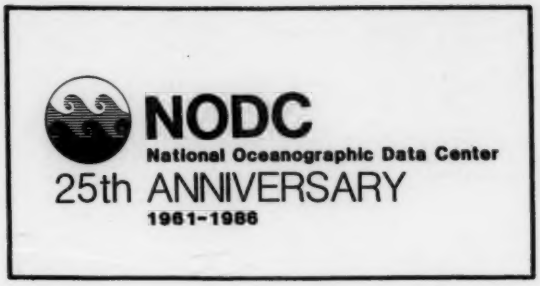

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